



LIFE INSURANCE CORPORATION OF INDIA  
EASTERN ZONAL OFFICE, ENGG. DEPTT. (4<sup>TH</sup> FLOOR)  
"HINDUSTHAN BUILDING", 4, C.R. AVENUE, KOLKATA – 700072  
PHONE: 033-22129077/22127443,  
E-mail: ez\_engineering@licindia.com  
AN ISO 9001:2015 CERTIFIED DEPARTMENT

# BID- I

**NAME OF WORK: *E-TENDER FOR PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL.***

**Tender No. : LIC/EZ/ENGG/2026-27/05 dated 11.05.2026**

**CONDITIONS OF CONTRACT AND TECHNICAL SPECIFICATIONS (THIS DOCUMENT IS TO BE STAMPED & SIGNED OF EACH PAGES BY LOWEST TENDERER ONLY AS & WHEN ASK FOR).**

**This document is a part of BID-II. The Earnest Money Deposit and Tender Document Fees is to be physically submit if the Tenderers are avail the option of Demand Draft/Pay Order/Banker's Cheque/NEFT UTR. No. at the following address by 17.30hrs of 18.05.2026:**

**Life Insurance Corporation of India.  
Eastern Zonal office.  
Engineering Department.  
"HINDUSTHAN BUILDING"  
4, C.R. Avenue (4<sup>TH</sup> floor)  
Kolkata - 700072**



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## **System Tender No: LIC/EZ/ENGG/2026-27/05 dated 11.05.2026**

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

Sr. No.	Name of Work	Estimated Cost (In Rs.)	Earnest Money Deposit (EMD)	Tender Document Fee(non-refundable)
1.	PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL	29,92.882.00	Rs. 59,900.00	Rs. 590.00 including 18% GST.

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

**3. Last Dates of various activities by bidder:**

- i) Downloading of Tender Documents : From 12.00 hrs on 11.05.2026  
Upto 17.30 Hrs on 18.05.2026
- i) Tender Closing Date & Time : Upto 17.30 Hrs on 18.05.2026
- ii) Opening of **BID- I & BID- II (F.B)** : On 19.05.2026 at 12:00 Hrs

For Registration and for further details on e-tendering, please visit website above mentioned portal (website) or below mentioned Helpdesk details.

**Office Address :**

E-Tender helpdesk  
 #24, Sudha Complex,  
 03rd Stage, 04th Block,  
 Basaveshwaranagara,  
 Bangalore - 560079,

**Help Desk Contact Details:**

Tel: 080-40482000/121/133/140  
 Mobile: 9686115304/9686115323  
 E-mail: [lokesh.hr@antaressystems.com](mailto:lokesh.hr@antaressystems.com)  
[raghuprashanth@antaressystems.com](mailto:raghuprashanth@antaressystems.com)



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## KEY DATES

Sl. No.	Department Stage	Contractor Stage	Start Date and Time	Closing Date and Time
1		Downloading of Tender Document	<b>11.05.2026 from 12.00 Hrs</b>	<b>18.05.2026 up to 17.30 Hrs</b>
2		Online submission of tender documents	<b>11.05.2026 from 12.00 Hrs</b>	<b>18.05.2026 up to 17.30 Hrs</b>
3		Last date of submission of EMD & Tender document fees, if tenderers avail the option through online NEFT/RTGS etc.	<b>11.05.2026 from 12.00 Hrs</b>	<b>18.05.2026 up to 17.30 Hrs</b>
4		Last date of physical submission of EMD & Tender document fees, if tenderers avail the option in form of DD/PO/MR in the office of LIC of India, EZO, Kolkata.	<b>11.05.2026 from 12.00 Hrs</b>	<b>18.05.2026 up to 17.30 Hrs</b>
5	Online Opening of EMD, TENDER Document fee & Financial BID.	-	<b>19.05.2026 at 12.00 Hrs.</b>	

### The venue of the Physical Submission of BID-II:

**Life Insurance Corporation of India**  
 Eastern Zonal Office,  
 Engineering Department (4<sup>th</sup> floor),  
 "Hindusthan" Building,  
 4, C.R. Avenue,  
**Kolkata-700072.**



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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 BID - I i.e. Earnest Money Deposit ,Tender document Fee in a sealed envelope is to be submitted physically if the tenderer to avail the option in form DD/PO/NEFT UTR No. CONDITIONS OF CONTRACT AND TECHNICAL SPECIFICATIONS (PART OF BID-I) is to be stamped & signed of each pages by lowest tenderer only as & when ask for:**

**The Chief Engineer,**  
**Life Insurance Corporation of India,**  
**Eastern Zonal Office,**  
**Engineering Department (4<sup>th</sup> floor),**  
**“Hindusthan” Building,**  
**4, C.R. Avenue,**  
**Kolkata- 700072.**

2. Last date for receipt of tenders: As per Key Dates is **up to 17.30 hours of 18.05.2026.**
3. Tenderer should ensure that the tender is received before the due date and time specified in the Key Dates of online tender.
4. 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.
5. The schedule of Quantities should be filled in as per the format given in the online e-Tender.
6. Tenderer should note that he is to quote percentage rates only.
7. No liability whatsoever will be admitted nor claim allowed in respect of errors in the submitted tender due to missing / duplicate uploaded documents.
8. Proforma of Articles of Agreement 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.
9. Earnest Money accompanying the tender will be accepted only in the form of Demand Draft/Pay Order/Banker's Cheque of any Nationalized Bank/Approved Scheduled Bank/RTGS/NEFT drawn in favour of “LIFE INSURANCE CORPORATION OF INDIA” payable at “**Kolkata**”. Any tender, which is not accompanied by Earnest Money Deposit, shall be summarily rejected. No interest will be paid for the period during which the earnest money lies in deposit with the LIC of India.
10. 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 tenderers can submit the scan copy of the same on the online portal.



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11. Contractors are warned that Cash, or Encashable Cheque, 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 Chief Engineer.
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.
14. The Life Insurance Corporation of India reserves the right to accept any tender or to accept tenders in part or to reject any or all tenders without assigning reasons thereof.
15. Contractors should fill in their “**PERCENTAGE RATE**” in the **SCHEDULE OF QUANTITIES** or **prescribed form provided on online portal in both FIGURES and WORDS**. Tenders containing the Item rate only in figures are liable to be considered non-bonafide at the discretion of the Chief Engineer and entail forfeiture of Earnest Money Deposit.
16. If on check there are differences between the Item rates given by the contractor in words and figures or in the amount worked out by him, the following procedure shall be followed :
  - 16.1 When there is a difference between the Item rates in figures and in words, the rates which correspond to the amounts worked out by the contractor, shall be taken as correct.
  - 16.2 When the amount of an item is not worked out by the contractor or it does not correspond with the Item rates written either in figures or in words, then the Item rate quoted by the contractor in words shall be taken as correct.
  - 16.3 When the Item rate quoted by the contractor in figures and in words tallied but the amount is not worked out correctly, the Item rate quoted by the contractor shall be taken as correct and not the amount.
  - 16.4 In the event no rate has been quoted for any item(s), leaving space both in figure(s), Word(s), and amount blank, it will be presumed that the contractor has included the cost of this/these item(s) in other item(s) and the rate for such item(s) will be considered as zero and work will be required to be executed accordingly.

**IMPORTANT NOTE: Please note that if submitted documents filed by the Tenderer are found false/forged or fabricated during verification process and / or after opening of financial bid, not only Earnest Money Deposit will be forfeited in totality but also they will be debarred from LIC of India from participating of tendering for a period of 3 (three) years and such information will also be shared with other Organizations.**



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## **INFORMATION & INSTRUCTIONS TO THE BIDDERS** **FOR USING ONLINE ELECTRONIC TENDERING SYSTEM (eTS)**

Special Conditions & instructions for using online Electronic Tendering System (eTS) through portal (website) <http://www.tenderwizard.com/LIC> adopted by Life Insurance Corporation of India (LIC), Eastern Zonal Office, Kolkata as given in the subsequent pages will over-rule the conditions stated in the tender documents, wherever relevant and applicable.

- **Registration of the Contractors/Bidders:** All the Contractors intending to participate in the tenders floated online using Electronic Tendering System (ETS) are required to get registered on the e-Tender Portal (website) <http://www.tenderwizard.com/LIC>

After successful Registration on above mentioned portal, contractor will get a User ID and Password to access the website.

- **Viewing of Online Tenders:** The contractors/bidders can view tenders floated on online Electronic Tendering System (ETS) hereinafter referred as “e-Tendering System” through portal (website) at <http://www.tenderwizard.com/LIC>. They can view the details like Tender Notice, Terms and Conditions, drawing (if any) and any other information. To download through they need to login on to the above portal and can download the tender documents of an e-Tender.
- **Obtaining a Digital Certificate and its Usage:** On e-Tendering System the bids should be Encrypted and Signed electronically with a Digital Signature Certificate (DSC) to establish the identity of the bidder on online Portal. The Digital Signature Certificates (DSCs) are issued by an approved Certifying Authority, by the Controller of Certifying Authorities (CCA India), Government of India.
- The contractors may obtain Class III digital certificate from any Certifying Authority or Sub-certifying Authority authorized by the Controller of Certifying Authorities on the portal <http://cca.gov.in>. or may obtain information and application format and documents required for issue of digital certificate from our Service Provider for Electronic Tendering System (ETS):

### **E-Tender helpdesk**

#24, Sudha Complex,  
 03rd Stage, 04th Block,  
 Basaveshwaranagara,  
 Bangalore - 560079,

### **Help Desk Contact Details:**

Tel: 080-40482000/121/133/140  
 Mobile: 9686115304/9686115323  
 E-mail: [lokesh.hr@antaressystems.com](mailto:lokesh.hr@antaressystems.com)  
[raghuprashanth@antaressystems.com](mailto:raghuprashanth@antaressystems.com)

- The Bid (Online Offer) for a particular e-Tender may be submitted only using the Digital Signature Certificate (DSC), In case, during the process of a particular e-Tender, the user loses his Digital Certificate (i.e. due to virus attack, hardware problem, operating system problem), he may not be able to submit the bid online. Hence, the users are advised to keep their Digital Signature Certificates in safe custody.



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- 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.
- Bidders participating in e-tendering shall check his/her validity of Digital Signature Certificate before bidding in the specific work floated online at the e-Tendering Portal (website) through <http://www.tenderwizard.com/LIC>.
- **Submission of Earnest Money Deposit:**
  - Earnest Money accompanying the tender will be accepted only in the form of Demand Draft/Pay Order/Banker's Cheque/RTGS/NEFT of any Nationalized Bank/Approved Scheduled Bank drawn in favour of "**LIFE INSURANCE CORPORATION OF INDIA**" payable at "**Kolkata**". Any tender, which is not accompanied by Earnest Money Deposit, shall be summarily rejected. No interest will be paid for the period during which the earnest money lies in deposit with the LIC of India.
  - Refund of Earnest Money Deposit to the unsuccessful bidders will be made through RTGS/NEFT.
  - 1. A scanned copy of Earnest Money Deposit in appropriate format as mentioned above should be uploaded mandatorily while Bid Preparation stage (as per the Key Dates mentioned in e-Tender and Tender document) and **original Demand Draft/Pay Order/Banker's Cheque/Money Receipt should be submitted to the Chief Engineer, Life Insurance Corporation of India, Eastern Zonal Office, Engineering Department (4<sup>th</sup> Floor), Hindusthan Building, 4, C.R. Avenue, Kolkata -700072 in the sealed envelope (BID I ) on or before the due date mentioned in Key Dates of e-Tender, otherwise your BID-I will not be opened if the tenderers avail the option in form of DD/PO. Tenderers shall also avail the option to pay online as EMD/Tender Fees through RTGS/NEFT in "Life Insurance Corporation of India" account as mentioned above (needs to physical submission of UTR no. etc. OR send by scan copy through email id: [ez\\_engineering@licindia.com](mailto:ez_engineering@licindia.com) before last date of submission of tender)**
- **Submission of Tender Document Fees:**
  - The Contractors have to submit a Demand Draft/Pay Order/Banker's Cheque/RTGS/NEFT of requisite amount as mentioned in the particular e-Tender against the Tender Document fees of any of the Nationalized/Scheduled Banks drawn in the favour of the "**Life Insurance Corporation of India**" payable at "**Kolkata**" only, and not in the favour of any other Authority or Location.
  - The scanned copy of the Demand Draft/Pay Order/Banker's Cheque/Money Receipt/UTR no for NEFT or RTGS against Tender Document Fees should be uploaded mandatory during Tender Submission stage (as per the due date mentioned in Key Dates of e-Tender) and original Demand Draft/Pay Order/Banker's Cheque/NEFT UTR No. should be submitted to the **Chief Engineer, Life Insurance Corporation of India, Eastern Zonal Office, Engineering Department (4<sup>th</sup> Floor), Hindusthan Building, 4, C.R. Avenue, Kolkata-700072** in the sealed envelope on or before the due date mentioned in Key Dates of respective e-Tender, otherwise your Tender will not be opened.
  - If the tenders are cancelled or recalled on any grounds, the tender document fees will not be refunded to the agency.
  - **The Eligible Bidders can download the Tender Document online from above e-Tendering Portal <http://www.tenderwizard.com/LIC> before the Tender closing date & time mentioned in the e-Tender floated.**



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**LETTER TO CONTRACTOR FROM CHIEF ENGINEER**

To,

\_\_\_\_\_

\_\_\_\_\_

Dear Sir / Sirs,

**SUB: E-TENDER FOR PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL.**

1) We hereby publish the TENDER on e-Tendering Portal (Website) through [www.tenderwizard.com/LIC](http://www.tenderwizard.com/LIC) in **Electronic Mode** hereinafter referred as “e-Tendering” and consisting of following :

- (a) **BID I : CONDITIONS OF CONTRACT AND TECHNICAL SPECIFICATIONS, EMD AND TENDER DOCUMENT FEES.** (This BID i.e. Conditions of contract and Technical Specifications is to be stamped & signed of each pages by lowest tenderer only and to be submitted as & when ask for)
- (b) **BID II : FINANCIAL BID**

Please note that copy of above e-Tender 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 document and online portal for above tender.**

2) The bidders should submit required Tender document Fee and Earnest Money Deposit in a manner/mode as mentioned in e-Tender process. Tender document fee of **Rs 500/- +@ 18% GST i.e. Rs.90.00 = Rs. 590.00** (Rupees five hundred ninety only) and **Earnest Money Deposit of Rs. 59,900.00** (Rupees Fifty Nine Thousand Nine Hundred only) shall be submitted separately.

a) Tender document fee of **Rs 500/- +@ 18% GST i.e. Rs.90.00 = Rs. 590.00** (Rupees five hundred ninety only) in the form of Crossed Demand Draft/ Pay order/ Bankers Cheque of any Nationalized/ Scheduled Bank drawn in favour of “**Life Insurance Corporation of India**” payable at “**Kolkata**”.

b) Earnest Money Deposit shall be submitted in the following form:-

**i)** The total amount of **Rs. 59,900.00 (Rupees Fifty Nine Thousand Nine Hundred only)** in the form of Crossed Demand Draft/ Pay order/ Bankers Cheque of any Nationalized/ Scheduled Bank drawn in favour of “**Life Insurance Corporation of India**” payable at “**Kolkata**”

( or )

**ii)** Tender document Fee of **Rs 500/- +@ 18% GST i.e. Rs.90.00 = Rs. 590.00** (Rupees five hundred ninety only) (non-refundable) and Earnest Money Deposit of **Rs. 59,900.00 (Rupees Fifty Nine Thousand Nine Hundred only)** payment through NEFT/RTGS mode directly to LIC Account.



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FOR BANK GUARANTEE SUBMISSION	FOR ONLINE NEFT/RTGS
Name of Bank: : IDBI BANK LIMITED	Name of Bank: : IDBI BANK LIMITED
Branch : Esplanade Branch	Branch : Esplanade Branch
Account No. : 1270102000014580	Account No. : 1270102000014580
IFSC No. : IBKL0000135	IFSC No. : IBKL0001270
Account Type : Current	Account Type : Current
All BG shall be verified through SFMS message.	

**\*\* NEFT/UTR No. and date receipt copies should be physically submitted to our office EZO, Engg Dept. Kolkata with sealed envelope OR send by scan copy through email id: [ez\\_engineering@licindia.com](mailto:ez_engineering@licindia.com) before opening if BID-I & II otherwise the same bidders to be disqualified.**

- iii) Tender document Fee of Rs 500/- +@ 18% GST i.e. Rs.90.00 = Rs. 590.00 (Rupees five hundred ninety only) (non-refundable) and Earnest Money Deposit of Rs. 59,900.00 (Rupees Fifty Nine Thousand Nine Hundred only) payment, you may also deposit in cash at our Zonal Office cash counter and money receipt copies should be physically submitted to our office EZO, Engg Dept. Kolkata with sealed envelope OR send by scan copy through email id: [ez\\_engineering@licindia.com](mailto:ez_engineering@licindia.com) before opening if BID-I & II otherwise the same bidders to be disqualified.
- 3) BIDs will be received at the office of Chief Engineer at above address **on or before As per the Key Dates** and the e-Tenders 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 e-Tender 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 e-Tendering 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.**
- 4) The Guidelines to Submit tenders on Electronic Tendering System (ETS) is part of **BID -I** of the Tender document. The tenderers are advised to carefully read the above document for understanding of e-Tendering System. The above Annexure will supersedes all the terms & conditions mentioned for submission of tender in document.
- 5) The Life Insurance Corporation of India does not bind itself to accept the lowest or any tender.

Yours faithfully,

CHIEF ENGINEER



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**LETTER FROM CONTRACTOR TO CHIEF ENGINEER**

**TO BE SUBMITTED ONLINE ON OR BEFORE ON As per the Key Dates**

Date:

From:

.....  
.....  
.....  
.....

To  
The Chief Engineer,  
Life Insurance Corporation of India  
Eastern Zonal Office  
Hindusthan Building,  
4, C.R. Avenue,  
**Kolkata - 700072**

**SUB: E-TENDER FOR PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL.**

Dear Sir,

1) Having examined the Technical Specifications & Conditions of Contract, Schedule of Quantities, etc. included in the tender document for the Percentage Rate Contract relating to the above work, having visited/examined the site of the existing premises, having acquired the requisite information relating thereto as effecting the tender invited by you on behalf of the Life Insurance Corporation of India, I/We, the undersigned hereby offer to carry out the above mentioned work on Percentage Rate basis in strict accordance with the Contract Conditions and Specifications.

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 intimation from you that the tender has been accepted and upon receiving possession of the site. I/We shall be under the obligation to complete the entire work within the period of completion failing which to pay the sum as stated in the Appendix to the Conditions of Contract for every week that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to extension of time.

2) I/We enclose herewith my/our tender with an Earnest money remittance of **Rs. 59,900.00 (Rupees Fifty Nine Thousand Nine Hundred only)** in the appropriate format as specified in BID-I. I/We, hereby agree that part of this sum shall be forfeited by the Life Insurance Corporation of India in the event of my/our tender being accepted and I/We fail to execute Contract when called upon to do so.



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3) 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.

**OR**

I/We, agree to furnish a lump sum Bank Guarantee for total Security Deposit **@5% of accepted tender amount** or two Bank Guarantees each with 50% value from any Nationalized/Scheduled Bank at as per specimen given in **Annexure "B"** to Conditions of Contract, within 10 (ten) days of acceptance of tender. The Bank guarantee shall be from any Nationalised /Scheduled Bank preferably at or where a Branch/Division of LIC of India exists.

4) I/We, note that the Earnest Money Deposit of **Rs. 59,900.00 (Rupees Fifty Nine Thousand Nine Hundred only)** would be refunded to me/us.

- a) On expiry of the validity of the tender or earlier at the discretion of Chief Engineer in case my/our tender is not accepted and
- b) In case my/our tender is accepted, after I/We, furnish as mentioned above.

5) I/We, agree,

a) in case my/our tender is withdrawn before expiry of the validity period or before the issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the Department, in such case 25% of the EMD will be forfeited by the department.

b) in case my/our tender is accepted and the Security Deposit option is not submitted within the prescribed period or approved extended period, 50% of the EMD will be forfeited automatically without any notice.

c) in case of forfeiture of Earnest money as prescribed above [5(a) and 5(b)], the tender shall not be allowed to participate in the retendering process of the work.

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)



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## CONDITIONS OF CONTRACT

### 1. INTERPRETATIONS:

- 1.1 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:
- 1.2 “Employer” shall mean THE LIFE INSURANCE CORPORATION OF INDIA and his (their) heirs, legal representatives, assignees and successors.
- 1.3 “Chief Engineer” shall mean the person occupying the post of head of the Zonal Engineering Department of the Corporation.
- 1.4 “Corporation’s Engineers” shall mean such Deputy Chief Engineers, Superintending Engineers and/or Executive Engineers of the Corporation, who shall from time to time be appointed by the Chief Engineer for supervising the work carried out by the Contractor or for any purpose in connection therewith:
- 1.5 The term “Site Engineer” shall mean the person appointed and paid by the Employer, acting under the order of the Corporation’s Engineer to superintend the work.
- 1.6 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.
- 1.7 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.
- 1.8 “This Contract” shall mean the Articles of Agreement, these Conditions, the General Instructions to Contractor, the General Preambles to Schedule of Quantities, Special Conditions, the priced Schedule of Quantities, the Specifications, the Appendices, the Drawings and other related correspondence.
- 1.9 “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.



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- 1.10 "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.
- 1.11 Words importing persons include Firms and Corporations, words importing the singular only also include the plural and vice versa where the context so requires.
- 1.12 The titles of the Clauses shall not affect or alter the meaning of Clauses and are solely for the purpose of facilitating reference.
- 1.13 The following abbreviations shall be followed for the designations of various LIC Officers:

**DESIGNATIONS**

**ABBREVIATIONS**

Executive Director (Engineering)	E.D.(E)
Zonal Manager	Z.M.
Chief Engineer	C.E.
Chief Architect	C.A.
Deputy Chief Architect	D.C.A.
Deputy Chief Engineer	Dy.C.E.
Superintending Engineer	S.E.
Senior Architect	S.A.
Executive Engineer	E.E.
Deputy Senior Architect	D.S.A.
Asstt. Secretary	A.S.

- 1.14 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 Corporation's Engineer are intended unless otherwise specified.
- 1.15 The words "as described" shall mean the description in the Special Conditions, Specifications, General Instructions, Drawings etc. of this tender.
- 1.16 The words "allow" shall mean that the Contractor shall include in his rates for the particular matter referred to.
- 1.17 "Day Work" shall mean items of labour and/or materials which in the opinion of the Corporation's Engineer are not capable of being evaluated by the accepted method of measurement and analysis.



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## 2. SCOPE OF CONTRACT:

2.1 The Contractor shall carry out and complete the works in every respect in accordance with this Contract and in accordance with the directions and to the satisfaction of the Corporation's Engineer. The Corporation's Engineer may issue further drawings and/or written instructions, details, directions and explanation in regard to:

- a. The variation or modification of the Design, quality of works or the addition or omission or substitution of any work;
- b. Any discrepancy in the Drawings or between the Schedule of Quantities and/or Drawings and/or Specifications;
- c. The removal from the site of any materials brought thereon by the Contractor and the substitution of any other material thereof;
- d. The removal and/or re-execution of any work executed by the Contractor;
- e. The dismissal from the work of any persons employed thereupon;
- f. The opening up for inspection of any work covered thereupon;
- g. The amending and making good of any defects under relevant Clause giving details of defects after completion.

2.2 The Contractor shall forthwith comply with and duly execute all works comprised in such Instructions subject to the provisions of relevant specific conditions of the Contract. In the event of any dispute or difference of opinion the contractor shall refer the matter within 7 (seven) days of the issue of such instruction to the Chief Engineer whose decision shall be final & binding.

## 3. DISCREPANCIES:

3.1 If there are varying or conflicting provisions made in any one document forming part of Contract, the Chief Engineer shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor.

3.2 The several documents forming the Contract are to be taken as mutually explanatory of one another, and the order of precedence shall be as follows;

- a) Special conditions
- b) General preambles to schedule of quantities
- c) General instructions
- d) Conditions of contract



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- 3.3 In case of discrepancies between the Schedule of Quantities, the specifications and/or drawings the following order of precedence shall be observed
- (a) Description in Schedule of Quantities
  - (b) Specifications of relevant Trade
  - (c) Drawings; detailed drawings shall be followed in preference to small scale drawings and figured dimension in preference to scale.
  - (d) Indian Standard Specifications of `BIS`

#### **4. DRAWINGS AND SCHEDULE OF QUANTITIES:**

- 4.1 Two complete sets of the Drawings and Specifications and Schedule of Quantities shall be furnished by the employer to the contractor. Two copies of the additional Drawings, if any, shall be furnished within such time as the Chief Engineer may consider reasonable which may be necessary for execution of any part of the work. Such copies shall be kept on the work site and the CE and his representatives shall at all reasonable times have access to the same and they shall be returned to the EE by the Contractor on completion of the contract.

This Contract and the signed Drawings, Specifications and Schedule of Quantities shall remain in the custody of the Employer.

#### **5. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY FOR EXECUTION OF WORK:**

- 5.1 Contractor shall provide everything necessary for the proper execution of the work according to the intent & meaning of the Drawings, Priced Schedule of Quantities and Specifications taken together, whether the same may or may not be explicitly shown or described therein provided that the same can reasonably be inferred there from and if the Contractor finds any discrepancy therein he shall immediately and in writing refer the same to the CE whose decision shall be final and binding on the Contractor.
- 5.2 The Contractor shall supply, fix and maintain at his cost during the execution of any work all the necessary Centering, Scaffolding, Staging, Planking, Timbering, Strutting, Shoring, Pumping, Fencing, Boarding, Watching and Lighting by night as well as by day, required not only for the proper execution and protection of the said work but also for the protection of the Public and the safety of any adjacent Roads, Streets, Cellars, Vaults, Ovens, Pavements, Walls, Houses, Buildings and all other erections, matters or things and the Contractors shall take down and remove any or all such Centering, Scaffolding, Staging, Planking, Timbering, Strutting, Shoring, etc., as occasion shall require or when ordered to do so, and shall fully reinstate and make good all matters and things disturbed during the execution of the work to the satisfaction of the Corporation's Engineer.



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## **6. AUTHORITIES NOTICES AND PATENTS:**

- 6.1 The Contractors shall conform to the provisions of any Acts of the Legislature relating to the work and to the Regulations and Bye-Laws of any Authority and or any Water, Lighting and other Companies and/or Authorities with whose system the structure is proposed to be connected and shall before making any variations from the Drawings or Specifications that may be necessitated by so conforming give to the CE written notice specifying the variations proposed to be made and the reasons for making them and apply for instructions thereon. In case the Contractor shall not within 7 (seven) days receive such instructions, he shall proceed with the work conforming with the Provisions, Regulations or Bye-Laws in question.
- 6.2 In particular, the Contractors shall be responsible to Register themselves under the Contract Labour (Regulation & Abolition) Act 1970 and Rules there under and any amendment thereto; they must comply with and carry out all the provisions and obligations under the said Act and Rules and furnish all information to Employer as may be required by it and shall indemnify the Employer against any penalties/claims arising from any default on their part.
- 6.3 The Contractor shall arrange to give all notices required by the said Acts, Regulations or Bye-Laws to be given to any Authority and to pay to such Authority or to any Public Office all fee that may be properly chargeable in respect of the work and lodge the receipts with the Employer.
- 6.4 The Contractors shall indemnify the Employer against all claims in respect of patent, rights, and shall defend all actions arising from such claims unless he has informed the Chief Engineer before any such infringement and received his permission to proceed and shall himself pay all royalties, licence fees, damages, costs and charges of all and every sort that may be legally incurred in respect thereof.
- 6.5 The Contractor should observe that his work shall not cause any nuisance to the Public in general and to the neighbouring occupants in particular.
- 6.6 Should the Contractor desire to work on Sundays, Holidays and during night hours, permission in writing from the Corporation's Engineer must be obtained in time. It shall be the responsibility of the Contractor to obtain permission from Civil Authorities, if necessary.



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7. **SETTING OUT WORK:**

7.1 The Contractor shall set out the work and shall be responsible for the true and perfect setting out of the same and for the corrections of the positions, levels, dimensions and alignment of all parts thereof. If at any time any error shall appear during the progress of any part of the work, the Contractor shall at his own cost rectify such error, if called upon, to the satisfaction of the Corporation's Engineer. The Contractor must not commence work until the outlines of the building and Centre line layout have been pegged out and approved by the Corporation's Engineer.

8. **CONTRACTOR IMMEDIATELY TO REMOVE OFFENSIVE MATTER:**

8.1 All soil, filth or other matter of an offensive nature taken out of any trench, sewer, drain, cesspool or other place shall not be deposited on the surface, but shall be at once carted away by the Contractor to some pit or place provided by him.

9. **MATERIALS AND SAMPLES:**

9.1 All the materials stores and equipment required for the full performance of the Contract must be provided through normal trade channels and must include applicable import duties and all applicable taxes and other charges, if any. They shall be of approved quality and the best of their kind available and the Contractor must be entirely responsible for the proper and efficient carrying out of the work. The Contractor shall order all materials required for the execution of the work from local as well as from outside sources if situation warrants so as early as necessary to the satisfaction of the Corporation's Engineer and to ensure that such materials are on site well ahead of requirement for use in the work. Non – availability of materials in local market will not be an issue behind slow progress of work.

9.2 Before ordering such materials, the Contractor shall get samples of the materials approved well in time. Preference shall be given to ISI marked products and approved brands of requisite quality as mentioned in the tender. For materials, which are neither approved brands nor ISI marked, the same shall be got tested from approved laboratories at the Contractor's cost before approval. Approved brand and ISI marked product will also be tested if desired by the CE and if the test results are satisfactory, the cost of testing shall be borne by the Employer otherwise by the Contractor. No claim will be allowed for delay to the progress of work caused by test. If called upon by the Executive Engineer the Contractor shall produce proof for having arranged for the supply of materials well in time.



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9.3 The Contractor shall furnish well in time before work commences at his own cost, any samples of workmanship that may be called for by the Corporation's Engineer for his approval and any further samples in case of rejection until such samples are approved. Such samples when approved shall be the minimum standard for the work to which they apply. In case of items like suspended ceiling, partitions, etc. typical sample panels or proto-types shall be erected in position for approval before undertaking work. Rates quoted shall cover for such preliminary work.

**10. ACCESS:**

10.1 Any of the Corporation's Engineers or any persons authorized by any one of them shall at all reasonable time have free access to the work and/or the workshops, factories or other places where materials are being prepared or constructed for the Contract and also to any place where the materials are lying or from which they are being obtained and the Contractor shall give every facility to all of them necessary for inspection and examination and test of the materials and workmanship. Except the representatives of the Public Authorities, no person shall be allowed on the work at any time without the written permission of the Corporation's Engineer.

If any work is to be done at a place other than the site of the work, the Contractor shall obtain the written permission of the Corporation's Engineer for doing so.

**11. CONTRACTOR'S SUPERVISION & MINIMUM REQUIREMENT OF TECHNICAL STAFF:**

11.1 The Contractor shall either himself supervise the execution of the contract or may appoint a Competent Agent approved by the CE to act in his stead.

11.2 Where the contractor is not a qualified Engineer or even if he is so qualified, he cannot in the opinion of C.E., give his full personal attention to the works, he shall at his own expense employ person(s) possessing the qualification and experience as described hereunder as his accredited agent to supervise the works and to receive instructions from Corporation's Engineers. Any directions, instructions or notices given by the Corporation's Engineer to such supervisor(s) shall be deemed to be given to the contractors.

**a. FOR WORKS COSTING UPTO Rs. 100 LAKHS :**

A qualified resident Engineer having a Government recognized Diploma in Civil Engineering and minimum of 2 years experience on building construction site.



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**b. FOR WORKS COSTING MORE THAN Rs. 100 LAKHS & UPTO Rs. 200 LAKHS :**

A qualified resident Engineer having a Recognised Degree in Civil Engineering or equivalent qualification and minimum of 2 years experience on building construction site/s or a recognized Diploma in Civil Engineering with minimum 5 years experience on such construction jobs.

**c. FOR WORKS COSTING MORE THAN Rs.200 LAKHS :**

i) A qualified resident Engineer having a Recognised Degree in Civil Engineering and minimum of 3 years experience of such major construction site/s or a recognized diploma in Civil Engineering with 8 years experience.

ii) In addition the contractor shall employ suitable number of supervisors with recognized degree / diploma in the relevant branches or recognized qualification & experience in the relevant trades for proper execution of the work as approved by the Chief Engineer.

d. The CE may vary any of the above qualification / experience at his discretion if so warranted by conditions prevailing and applicable to any particular work such as Air-conditioning, HT, and Interiors etc.

e. If the contractor fails to employ suitable person(s) to supervise the work or fails to appoint replacement(s) when necessitated, amount as stipulated in the Appendix to the conditions of contract shall be recovered from the contractor for each Engineer and each supervisor for the period of non-employment.

**12. DISMISSAL OF WORKMEN:**

12.1 The Contractor shall, on the instruction of the Corporation's Engineer, immediately dismiss from the work any person employed thereon, who may, in the opinion of the Corporation's Engineer, be unsuitable or incompetent or who may misconduct himself and such person shall not be again employed or allowed on the work without the permission of the Corporation's Engineer.

**13. DATES OF COMMENCEMENT AND COMPLETION:**

13.1 The "Date of Commencement" shall be as stated in the Work Order and the Contractor shall thereupon and forthwith begin the work and shall regularly proceed with and complete the same on or before the "Date of Completion" stated in the Work Order, subject to the provisions for extension of time hereinafter contained.



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**14. ASSIGNMENT:**

14.1 The whole of the work included in the Contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the Contract or any part, share of interest therein nor shall he take a new partner without the written consent of the CE and no subletting shall relieve the Contractor from the full and entire responsibility of the Contract or from the active superintendence of the work during its progress.

**15. DEVIATION, VARIATION, EXTRA/DEVIATED ITEMS AND PRICING:**

- 15.1 The Contractor should note that unless otherwise stated, the tender is strictly on Item Rate basis and his attention is drawn to the fact that rates for each and every item should be correct, workable and self supporting. The quantities in the Schedule of Quantities approximately indicate the total extent of work and no variation i.e. additions, omissions or subtractions shall vitiate the Contract. No liability shall attach to the Employer for any error therein or variation there from.
- 15.2 The contractor may when authorized and shall when directed, in writing by the CE or the Corporation's Engineers, whom the CE may for that purpose appoint, add to, omit from, make alterations in, substitutions for, or vary the works shown upon the Drawings or described in Specifications or included in the priced Schedule of Quantities but the Contractor shall make no additions, omissions, alterations, substitutions or variations without such authorization or direction. A verbal authority or direction by the CE, if confirmed by the contractor in writing within 7 (seven) days, be deemed to have been given in writing.
- 15.3 The rates of such altered, additional or substituted works shall be determined in accordance with the following.
- a. The net rates or prices in the original tender shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced therein.
  - b. The net price of the items in the original tender shall determine the value of the items omitted. However, if omissions vary the conditions under which any remaining items of the work are carried out or if the amount of any omission relative to the amount of the whole of the Contract works or to any part thereof shall be such that in the opinion of the Chief Engineer, the net rate or price contained in the Priced Schedule of Quantities or Tender or for any item of work involves loss or expenses beyond that reasonably contemplated by the Contractor and is by reason of such omission rendered unreasonable or inapplicable, the Chief Engineer shall fix another rate or price as in the circumstance he shall think reasonable and proper.



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- c. If the rate for any altered, additional, or substituted item of work is not specified in the schedule of quantities, the rate for that item shall be derived from the rate for the nearest similar item specified therein.
- d. If the rate for altered, additional or substituted item of work cannot be determined in the manner specified above, then such items of work shall be priced on the basis of coefficients of labour and materials as given in the latest CPWD rate analysis handbook and rates for labour and materials wherever applicable shall be the market rate prevailing at the time of execution.
- e. Where such co-efficient are not available in C.P.W.D. rate analysis, the actual Labour/Materials involved and recorded by the Executive Engineer in executing the items shall be considered.
- f. Where extra work cannot be properly measured or valued, the Contractor shall be allowed "Day Work" prices at the net rates stated in the Tender or the Priced Schedule of Quantities or, if not so stated, then in accordance with the local "Day Work" rates and wages for the district, provided that in either case vouchers specifying the date and time (and if required by the EE the names of workmen employed) and materials incorporated be delivered for verification to the EE or his representative at or before the end of the week following that in which the work has been executed. The EE is not bound to recognize the cost of materials furnished in vouchers; the CE at his discretion will fix the price of such materials based upon market value.
- g. While fixing rates of extra items 15% (Fifteen percent only) shall be allowed over & above the basic rate of material (without GST), T & P, water charges and labor to cover all supervision, overheads, profits and all other applicable taxes/cess. GST on works contract will be paid separately.
- h. Where the quantities of any item in the schedule exceeds by 100% in foundation and in plinth, and 50% in super-structure (above plinth), these extra quantities over 100% & 50% respectively will be treated as extra items of work and priced accordingly as above. [Items such as roads, pavements etc. shall be considered as below plinth]. The decision of CE for terming items below or above plinth is final & binding on the contractor.
- i. For all extra items of work, the contractor should submit to the concerned Corporation's Engineer the necessary particulars along with his analysis and the rate he proposes to claim for consideration within a period of 4 (four) weeks from the time of cropping up of any authorized extra / deviated item. He shall also ensure that all the authorized claims are included in the final bill. If the contractor fails to submit his claim within the stipulated period or the period duly extended by the Corporation's Engineer, then the CE shall proceed to fix the rate for the item(s) and the same shall be final and binding on the contractor.



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- j. The Contractor shall note that Extra/Deviated items claim and/or any other claim whatsoever if submitted after submission of his Final Bill, will not be entertained and considered by the Employer. The Contractor shall not be allowed to make any Additions/ Alterations/ Revisions / Changes/ Modifications/ Variations in the final bill, after the final bill is submitted by him.

**16. SUB-CONTRACTORS:**

- 16.1 All specialist Merchants, Tradesmen and others, executing any work or supplying, fixing any goods for which provisional sums are included in the Schedule of Quantities and/or Specifications, who may be nominated or selected by the CE, who shall be the final authority are hereby declared to be Sub-Contractors and are herein referred to as nominated Sub-Contractors.
- 16.2 No nominated Sub-contractor shall be employed on or in connection with the work against whom the Contractors shall make reasonable objection or (save where the CE and the Contractor shall otherwise agree) who will not enter into a Contract providing:-
- a. That the nominated Sub-Contractor shall indemnify the Contractor against the same obligation in respect of the Sub-Contractor as the Contractor is under, in respect of this Contract;
  - b. That the nominated Sub-Contractor shall indemnify the Contractor against claims in respect of any negligence by the Sub-Contractor or his servants or agents or any misuse by him or them of any scaffolding or other plant or the property of the Contractor or under any Workmen's Compensation Act in force.

**17. THIRD PARTY LIABILITY, DAMAGE TO NEIGHBOURING PROPERTY, LOSS OF MATERIAL AND WORKMEN'S COMPENSATION:**

- 17.1 The Contractor shall be responsible for all injury to persons, animals or things, and for all damage to structural and/or decorative part of property which may arise from the operations or neglect of himself or of any Sub-contractor or any of his Sub-Contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of his Contract. This Clause shall be held to include inter-alia, any damage to Building, whether immediately adjacent or otherwise and any damage to roads, streets, footpaths, bridges, or ways as well as all damage caused to the building, and the works forming the subject of this Contract by frost, rain, wind or other inclemency of the weather. The Contractor shall fully indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of all and any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of any award or compensation or damages consequent upon such claim.



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- 17.2** The Contractor shall fully indemnify the employer against any loss, damage or deterioration for whatever reason, of all materials brought at site and especially material supplied by or paid for partly or wholly by the employer.
- 17.3** The Contractor shall reinstate all damage and loss of every sort mentioned in this Clause so as to deliver up the whole of the Contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of the third parties.
- 17.4** The Contractor shall fully indemnify the Employer against all claims which may be made against the Employer by any member of the Public or other third party in respect of anything which may arise in respect of the works or in consequence thereof.
- 17.5** The contractor shall at his own expense arrange to effect from the date of commencement & maintain till the date of virtual completion of contract, with any licensed general insurance company, a **POLICY OF INSURANCE( Contractor's All Risk Policy)** to cover all such risks detailed above viz. loss, damage & third party liability etc. The policy shall be of an amount as mentioned in Appendix to Conditions of contract and in the joint names of the employer & contractor and shall be deposited with the employer and renewed as required from time to time during the currency of the contract.
- 17.6** The Contractor shall also fully indemnify the Employer against all claims which may be made upon the Employer, whether under the **WORKMEN'S COMPENSATION ACT** or any other **STATUTE** in force during the currency of this Contract or at Common law in respect of any Employee of the Contractor or any Sub-Contractor and shall at his own expense effect and maintain until the Virtual completion of the work, with "licensed General Insurance Company" a **POLICY OF INSURANCE** of adequate amount in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with the employer & renew the same as required from time to time during the currency of the Contract.
- 17.7** The Contractor shall be responsible for anything, which may be excluded from the Insurance Policies above referred to, and also for all other damage to any property arising out of or incidental to the negligence or defective carrying out of the Contract.
- 17.8** The amount of insurance to be taken for the above policies will be jointly decided between the contractor and the employer before issue of acceptance letter based on the tendered cost, nature of work, location of site, local hazards etc.



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- 17.9** In default of the Contractor insuring as provided above, or having insured failing to renew the same as required the Employer on his behalf may so insure/renew and may deduct the premiums paid from any monies due or which may become due to the Contractor together with penalty as the CE deems appropriate.
- 17.10** The Contractor shall also fully indemnify the Employer in respect of any costs, charges or expenses arising out of any claim or proceedings at law and also in respect of any award of compensation of damages arising there from.
- 17.11** The Employer shall be at liberty and is hereby empowered to deduct fully the amount of any damages, compensation costs, charges and expenses arising or accruing any such claim of damage from any sum or sums due or to become due to the Contractor.

**18. DELAY AND EXTENSION OF TIME:**

18.1 If the works be delayed due to any of the following:

- (a) by force majeure ,
- (b) by reason of any exceptionally inclement weather,
- (c) by reason of proceedings taken or threatened by, or disputes with, adjoining or neighbouring owners, or public authorities,
- (d) by the work, or delays, of other Contractors or Tradesmen engaged by the Employer,
- (e) by reason of any additional work or instruction ordered by the employer,
- (f) by reason of Civil Commotion, local commotion of workmen or strike or lock-out affecting any of the building trades,
- (g) in consequence of the Contractor not having received in due time necessary instructions from the CE for which he shall have specifically applied in writing,
- (h) from other causes which the CE may certify as beyond the Control of the Contractor,
- (i) by reason of non-payment of interim certificate at specified time,

Then upon the happening of any such event causing delay, the contractor shall immediately, give notice thereof in writing to the Corporation's Engineer, but shall nevertheless use constantly his best endeavours to make good this delay.

18.2 Request for extension of time shall be made by the contractor **at the earliest** of the event causing delay.



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- 18.3 In case of strike or lockout the Contractor shall give written notice thereof to the CE as soon as possible but he shall nevertheless constantly use his endeavours to prevent delay and shall do all that may reasonably be required to the satisfaction of the CE to proceed with the work.
- 18.4 The CE shall make a fair and reasonable assessment of the delay and grant extension of time accordingly. Such extension shall be communicated to the contractor by the Corporation's Engineer immediately within **30 (Thirty) days of the date of receipt of request for extension**. Non-application by the contractor for extension shall however not be a bar for giving fair and reasonable extension which shall be as decided by the CE.
- 18.5 The decision of the CE as communicated by the Corporation's Engineer to the contractor on the extension of time shall be final & binding.
- 18.6 No claim in respect of compensation or otherwise, howsoever arising, as a result of extension granted under the above conditions shall be admissible.
- 19. COMPENSATION IN THE FORM OF PENALTY FOR DELAY OF WORK:**
- 19.1 Compensation in the form of Penalty for delay of work @ 0.5% of contract sum per week of delay subject to maximum 10% of contract sum. The amount of compensation in the form of Penalty shall be adjusted or set-off against any sum payable to the Contractor under this or any other contract with LIC.
- 20. FAILURE BY CONTRACTOR TO COMPLY WITH CE'S INSTRUCTIONS :**
- 20.1 If the Contractor after receipt of written notice from the CE, requiring compliance with such further Drawings and/or his instructions, fails within 7 (seven) days to comply with the same the CE may employ and pay other persons to execute any such work whatsoever as may be necessary to give effect thereto and all additional costs incurred in connection therewith shall be deducted from any money due or to become due to the Contractor.
- 21. PAYMENT OF BILLS :**
- a. MEASUREMENT OF WORKS**
- 21.1 The EE may, from time to time, intimate the contractor that he requires the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the EE or his representative in taking such measurements and calculations and to furnish all particulars or to give all assistance required by either of them. All items having a financial value shall be entered in the Measurement Book. All measurements and levels shall be taken jointly by the Contractor or his authorized representative and Site Engineer or his authorized representative from time to time



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during the progress of the work and such measurements shall be signed and dated by both the parties in token of their acceptance. If any of the measurements recorded are objected by any one of the party, a note shall be made to that effect with reason, signed by both parties and referred to Corporation's Engineer whose decision in the matter shall be final and binding. Measurements can also be recorded through electronic medium where specifically approved by Chief Engineer.

- 21.2 Should the contractor not attend or neglect or omit to send such representative, then the measurements taken by the EE or representative shall be taken to be correct measurements of the work. Wherever not specified in the "Schedule of Quantities or elsewhere" the mode of measurements shall be in accordance with the latest brochure issued by the Indian Standards Institutions (now renamed as Bureau of Indian Standards) on "Method of measurement of Building works".
- 21.3 The Contractor or his representative may, at the time of measurement, take such notes and measurements as he may require.
- 21.4 All authorized extra work. Omissions and all variations made without the Chief Engineer's knowledge, if subsequently sanctioned by him in writing, shall be included in such measurement.
- 21.5 If the contractor or his authorised representative does not record the measurements periodically for the completed works, then the site Engineer shall take measurements after giving notice in writing of at least 3 (three) days. Measurements recorded in the absence of Contractor shall be intimated with a copy of such measurements to the contractor. If the contractor fails to countersign or record objections within a week from the date of measurement, then such measurement recorded in absence by the Site Engineer shall be deemed to be accepted by and binding on the Contractor.
- 21.6 The Contractor shall, without any extra charge provide all assistance with every appliance, labour and other things necessary for taking measurements (either by him or by site Engineer) and recording levels including test checking of such measurements by any person authorised by the Employer.
- 21.7 All work shall be measured net as fixed in its place. All measurements of 'cutting' shall be held to include for the consequent wastage on the materials used.
- 21.8 Except where any general or detail description of the works expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items for which procedure is not covered in the specification, measurement shall be taken in accordance with the relevant Standard Method of measurement issued by BIS and if for any item no such standard is available then a mutually agreed method shall be followed.



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21.9 Measurements of all hidden/concealed items of work including extra items if any, such as, work in foundations including excavations, plinth filling, masonry, concrete etc. steel in all R.C.C. work, pipe to be encased etc. shall be jointly recorded by the contractor and Site Engineer or his authorised representative before they are covered up. Immediately after the work is ready for measurements, Contractor will give specific notice to the Site Engineer for recording the measurements. If the Site Engineer or his authorised representative fails to record the measurements, the Contractor will refer the matter to the Corporation's Engineer for instructions, but in no case shall cover up work without the latter's permission.

## 22. PAYMENTS:

22.1 The contractor shall be paid by the Employer, from time to time, by installment under Interim Certificate to be issued by the EE to the Contractor on account of the work executed, when in the opinion of the EE, work to the approximate value named in the Appendix to the conditions of Contract as "Value of work for Interim certificate" (or less at the reasonable discretion of the Executive Engineer) has been executed in accordance with this contract, subject however to a retention of the percentage of such value mentioned in Appendix to the Conditions of Contract hereto as "Retention percentage on account of Security Deposit". The Interim Certificate shall be based upon interim Bills of Running Account Bills to be prepared by the Contractor and supported by the detailed measurements. The EE may include 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, after satisfying price of materials on basis of vouchers/bills submitted by the contractor.

In case any material have been supplied by the Employer to the contractor in connection with the work, necessary recovery for the same shall be effected from the bills of the contractor by the CE at the issue rates of such materials as stipulated while calling for tenders and in other cases at a stock rate or market rates of such materials, whichever is higher. The contractor will, however, not be entitled to modify his rates for items of work requiring use of such materials and when the work has been virtually completed and the CE shall have certified in writing that it has been so completed on the basis of detailed measurements and after obtaining written endorsement by the CE that the CE/ Deputy Chief Engineer has made a final Scrutiny and that there are no disputed items, rates of quantities, the contractor shall be paid by the Employer in accordance with certificate to be issued by the CE the sum of money named in the Appendix as "Installment after Virtual Completion" and the contractor shall be entitled to the payment of the final bill in accordance with the final certificate to be issued in writing by the Deputy Chief Engineer with the approval of the CE with expiration of the period referred to as "Defects Liability Period", in the Appendix to Conditions of Contract hereto from the date of Virtual Completion or as soon after the expiration of such period as to work shall



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have been finally completed and all defects made good according to the true intent and meaning hereof, whichever shall last happen.

Provided always that the issue by the EE of any certificate during the progress of the works or at after their completion shall not relieve the contractor from his liability under Clause (2) in cases of fraud, dishonesty or fraudulent concealment relating to the work of materials or to nay matter dealt with in the certificate in case of all defects and insufficiencies in the work or materials which a reasonable examination would not have disclosed. No certificate of the Deputy Chief Engineer or Executive Engineer shall of itself be conclusive evidence that any work or materials to which it related are in accordance with the contract.

The Chief Engineer may make any correction in previous certificate which shall have been issued by the Executive Engineer/Superintending Engineer. Payment upon the EE's certificate shall be made within the periods named in the Appendix "Period for honouring Interim Certificate" after such a certificate has been delivered to the Employer. The CE shall have power to withhold any certificate if the work or any parts thereof are not being carried out to his satisfaction.

**22.2** Provided always that the issue by the Corporation's Engineer of any Certificate during the progress of the works or after their completion shall not relieve the Contractor from his liability in cases of fraud, dishonesty or fraudulent concealment relating to the work or materials or any matter dealt with in the Certificate in case of all defects and insufficiencies in the work or materials which a reasonable examination would not have disclosed. No Certificate of the Corporation's Engineer shall of itself be conclusive evidence that any work or materials to which it related are in accordance with the Contract.

**22.3** Payment upon the Corporation's Engineer's Certificate shall be made within the periods named in the Appendix "Period for honouring Interim Certificate" after such a Certificate has been delivered to the Employer;

**22.4** The CE shall have power to withhold any Certificate if the work or any parts thereof are not being carried out to his satisfaction. However, if the final certificate is not issued within the period as mentioned under Clause No.22.5, 26 due to Audit para by CTE etc., the amount involved for such items of deficient work as decided by Chief Engineer would be with held. The same would be allowed as agreed upon by the CTE & the Chief Engineer and the final certificate would accordingly be issued and final bill passed. For such withheld amount, a simple interest @ 6% per annum shall be paid to the contractor along with the said payment. Such interest will be calculated from the last date (as mentioned in Appendix to Conditions of Contract) for honoring final certificate till the date of payment.



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22.5 The measurements and valuation in respect of the Contract shall be completed within the "period of Final Measurement" stated in the Appendix or if not so stated then within six months of the completion of the contract works as defined in Clause (26) hereof. No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished.

22.6 The final certificate shall be based on the submission of final measurements or overall measurements of the work (to be taken if so directed by Corporation's Engineer) with all relevant details similar to 22.1 above. The CE may direct the Contractor to resubmit details if the same are found incomplete to issue the final certificate and his decision to accept the details is final and binding on the Contractor. Final Certificate shall be issued by the CE after the conditions are met with as per 22.4, 22.5, 22.6 and 26 and contractor's submission of **No Claim certificate cum receipt** as per the Proforma given in Appendix to Conditions of Contract.

### **23. SECURED ADVANCE AGAINST MATERIALS (*Not applicable for this tender*)**

23.1 The Contractor shall be entitled to be paid advance along with interim bill against materials which are not perishable and which are in the opinion of Corporation's Engineer, required for the works and have been brought on site for incorporation in the work but have not been so incorporated and are safeguarded against loss due to any cause whatsoever, (refer clause no-17). The amount of such advance against materials shall be arrived at on the following basis:

- a) 80% of the market value of materials required for the work and brought on site.

**OR**

80% of the cost of such materials (brought on site) as derived from the relevant accepted tender rate for the particular item involving such materials, whichever is lower.

- b) Such advance payment made against materials shall be recovered from or adjusted from the interim bills as and when the materials are utilized in the work.

Examples of certain perishable materials on which no advance shall be paid are Sand, Paint, Bitumen, Hard Boards/Soft Boards and other paper products, Petroleum Products, Coal Tar, and Insulating Boards etc.

23.2 In case of dispute, the decision of the Chief Engineer on whether advance payment can be made against specific materials shall be final and binding.



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**24. UNFIXED MATERIALS AND EQUIPMENTS:**

24.1 All tools, plants and materials brought to the site by the Contractor shall vest in the Employer and shall not be removed from the site of works except by permission of the Corporation's Engineer in writing. The Employer shall have a lien on these materials and plants.

**25. REMOVAL OF IMPROPER WORK:**

25.1 The Corporation's Engineer shall during the progress of the work have power to order in writing from time to time the removal from the work within such reasonable time or as may be specified in the order, of any materials, which in their opinion are not in accordance with the Specifications or instructions, the substitution of proper materials and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the Drawings and Specifications or Instructions and the Contractor shall forthwith carry out such an order at his own cost. In case of default on the part of the Contractor to carry out such an order, the CE shall have the power to employ other persons to carry out the same and all expenses consequent thereon or incidental thereto as certified by the EE shall be borne by the Contractor and may be deducted from any amounts due or that may become due to the Contractor.

**26. VIRTUAL COMPLETION:**

26.1 The work shall be completed in accordance with the Contract and to the entire satisfaction of Chief Engineer. All unused materials, tools, plants, scaffoldings, temporary structures, hutments and things belonging to the Contractor shall be removed and the site of works cleared of rubbish and all waste materials by the contractor at his own expenses and delivered up tidy to the employer. After completion of the work, the contractor will serve a written notice to the CE to this effect. The Chief Engineer after satisfying himself shall thereupon approve the virtual completion. The Defect Liability Period shall commence from the date of such certification.

**27. DEFECTS AFTER COMPLETION:**

27.1 The defects, shrinkage, settlements or other faults, which may appear within "the Defects Liability Period, stated in the "Appendix to the Conditions of Contract" or if not stated then, within 12 (twelve) months after virtual completion of the work, arising on account of materials or workmanship not in accordance with the Contract shall, upon the directions in writing of the Corporation's Engineer and within such reasonable time specified therein, be amended and made good by the Contractor at his own cost unless the CE shall decide that he ought to be paid for such amendment and for making good, and in case of default, the CE may employ and pay other persons to amend



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and make good such defects, shrinkage, settlement or other faults, and all damages, loss and expenses consequent thereon or incidental thereto shall be recovered from any monies due or that may become due to the Contractor. The CE may in lieu of such amending and making good by the Contractors, deduct from any money due or that may become due to the Contractor, a sum to be determined by the CE equivalent to the cost of amending such work. Should any defective work have been done or materials supplied by any Sub-Contractor employed on the work, who has been nominated or approved by the CE as provided in Clause No.16 the Contractor shall be liable to make good in the same manner as if such work or material had been done or supplied by the Contractor and been subjected to the provisions of this Clause and Clause No.2 hereof. The Contractor shall remain liable under the provision of this Clause notwithstanding the payment of any Certificate or the passing of any accounts.

## **28. PROVISIONAL SUMS, APPLICATION OF:**

- 28.1 For all the work listed under items for which provisional sums are provided in the tender, the CE reserves the right to invite separate tenders or select or order from any manufacturer or firms at his discretion and reserves to himself the right of paying direct to persons or firms for any such work. The Contractor will not have any claims over these items, but if tenders are invited for such items, he will also be invited to quote along with others.
- 28.2 If ordered by the CE, Contractor shall be required to carry out provisional sum items at the same conditions and rates as applicable for this Contract.

## **29. OTHER PERSONS ENGAGED BY THE EMPLOYER:**

- 29.1 CE reserves the right to execute any work not included in this Contract, which he may desire to have carried out, by other persons and the Contractor shall allow all reasonable facilities and the use of his scaffolding and plant for the execution of such work, but is not required to provide any special plant or materials for the execution of such work except by special arrangement with the Employer. Such work shall be carried out in such manner as not to impede the progress of the work included in the Contract and the Contractor shall not be responsible for any damage or delay which may happen to or be occasioned by such work.

## **30. SUSPENSION BY THE CONTRACTOR:**

- 30.1 If the Contractor except on account of any legal restraint upon the Employer preventing the continuance of the work, shall suspend the work or in the opinion of the CE shall neglect or fail to proceed with due diligence in the performance of his part of the Contract or if he shall make default in respect of Clause No.2, the Employer shall have the power to give notice in writing to the Contractor requiring that the work be proceeded within a reasonable manner and with reasonable



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dispatch. Such Notice shall purport to be a notice under this clause. After such notice is given, the Contractor shall not be at liberty to remove from the site of the work or from any ground contiguous thereto any plant or materials belonging to him, which shall have been placed thereon for the work and the Employer shall have a lien upon all such plant and materials to subsist from the date of such notice being given until the notice shall have been complied with. If the Contractor shall fail for 7 (seven) days after such notice given to proceed with the work as therein prescribed, the CE may proceed as provided in Clause No.31.

### **31. DETERMINATION OF CONTRACT BY EMPLOYER:**

- 31.1 If the Contractor (being an individual or a firm) commit any "Act of Insolvency" or shall be adjudged as Insolvent or shall make an assignment or composition of the greater part in number or amount of his creditors or shall enter into a deed of assignment with his creditors, or being an Incorporated Company shall have an order made against him or pass an effective resolution for winding up either compulsorily or subject to the supervision of the Court or Voluntarily or if the official Assignee of the Contractor shall repudiate the Contract or if the official Assignee or the Liquidator in any such winding up shall be liable within 7 (seven) days after notice to him requiring him to do so, to show to the reasonable satisfaction of CE that he is able to carry out and fulfill the Contract and if required by the CE to give security therefore or if the Contractor (whether an Individual Firm or Incorporated Company) shall suffer execution to be issued or if the Contractor shall suffer any payment under this Contract to be attached by or on behalf of any of the creditors of the Contractors or if the contractor shall assign or sublet the Contract without the consent in writing of the CE first obtained or if the Contractor shall charge or encumber this Contract or any payment due or which may become due to the Contractor there under, or if the CE shall certify in writing that in his opinion the Contractor,
- a. has abandoned the Contract, or
  - b. has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the work for 7 (seven) days after receiving from the CE written notice to proceed, or
  - c. has failed to proceed with work with such due diligence and failed to make such due progress as would enable the work to be completed within the time agreed upon, or
  - d. has failed to complete the work within the stipulated date including authorized extensions or
  - e. has failed to remove the materials from the site or to pull down and replace the work within 7 (seven) days after receiving a written notice from the Corporation's Engineer that the said materials or work were condemned or rejected or



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- f. has neglected or failed persistently to observe and perform all or any of the acts, matters, or things, by this Contract to be observed and performed by the Contractor for 7 (seven) days after written notice shall have been given to the Contractor requiring the Contractor to observe or perform the same, or
- g. has to the detriment of good workmanship or in defiance of the CE's instructions to the contrary sub-let any part of the Contract.

then and in any of the said causes, the CE notwithstanding any previous waiver, after giving 7 (seven) days notice in writing to the Contractors, determine the Contract, but without thereby affecting the powers of the CE or the obligations and liabilities of the Contractor, the whole of which shall continue to be in force as fully as if the contract has not been so determined and as if the work subsequently executed had been executed by or on behalf of the Contractor. And further, the Employer, his agents or servants, may enter upon and take possession of the work and all plant, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials, lying upon the premises or the adjoining lands or road and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the work or by employing any other Contractors or other person or persons to complete the work, and the Contractor shall not in any way interrupt or do any act, matter, or thing to prevent or hinder such other Contractor, other persons or person employed for completing and finishing or using the materials and plant for the work. When the work shall be completed or as soon thereafter as convenient, the CE shall give a notice in writing to the Contractor to remove his surplus materials and plant and should the Contractor fail to do so within a period of 14 (Fourteen) days after receipt thereof by him, the Employer may sell the same by public auction and shall give credit to the Contractor for the amount so realized. The CE shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to or by the Employer for the value of the said plant and materials so taken possession of by the Employer and the expense or loss which the Employer shall have been put to in getting the work to be so completed, and the amount, if any, owing to the Contractor and the amount, which shall be so certified shall thereupon be paid by the Employer to the Contractor or by the Contractor to the Employer, as the case may be and the Certificate of the CE shall be final and conclusive between the parties.

### **32. TERMINATION OF CONTRACT BY CONTRACTOR:**

- 32.1 If payment of the amount payable by the Employer under any Certificate of the EE shall be in arrears as unpaid for 60 (sixty) days after notice in writing requiring payment of the amount with interest of aforesaid shall have been given by the Contractor to the Employer, or if the work be stopped for six months under order of the CE or by any injunction or other order of any Court of Law, then and in any of the said cases, the Contractor shall be at liberty to determine the Contract



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by notice in writing to the Employer and he shall be entitled to recover from the Employer payment for all the work executed and for any loss, he may sustain upon any plant or material supplied or purchased or prepared for the purpose of the Contract.

- 32.2 In arriving at the amount of such payment, the net rates contained in the Contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with Clause No.15 hereof.

**33. DETERMINATION OF CONTRACT DUE TO ABANDONMENT OR REDUCTION IN SCOPE OF WORK:**

- 33.1 If at any time after the acceptance of the tender, the Employer shall for any reasons whatsoever not require the whole or any part of the works to be carried out, the CE shall give notice in writing to the Contractor who shall have no claim to any payment of compensation or otherwise whatsoever on account of any profit or advantage which he might have derived from the Execution of the whole of the works.

The Contractor shall be paid at contract rates for the full amount of work executed and in addition:

a. The cost at site of all surplus approved materials collected for incorporation in the work, which the Contractor does not wish to retain and which shall thereafter become the property of the Employer.

b. Where the Contractor desires to retain the surplus of approved materials (excepting materials supplied by the Employer or obtained in Employer's name, which shall, in any case, be returned to the Employer) the cost of handling and cartage charges for removal from the site to a reasonable distance not exceeding 25 kms.

c. If upon the determination of the Contract under this condition, the Contractor is of the opinion that he has suffered hardship by reason of the operation of these conditions, he may refer the circumstances with full details to the Chief Engineer, who on being satisfied that such hardship exists or has existed, shall make such allowance, if any as in his opinion is reasonable, and his decision shall be final, conclusive and binding.

**34. DISPUTES TO BE FINALLY DETERMINED BY CHIEF ENGINEER:**

- 34.1 **The Instruction, Decision, Opinion, Direction, Certificate or Valuation of the CE with respect to all or any of the matters under Clause (2), (3), (5), (6), (9), (14), (15), (18), (23), (27), (30), (31) and (33) hereof (which matters are herein referred to as EXCEPTED MATTERS) shall be final and conclusive and binding on the parties hereto and shall be without appeal. Any other Decision, Opinion, Direction, Certificate or Valuation of the CE or any refusal of the CE to give any of the same shall be subject to the right of Arbitration and review as given under Clause No.36.**



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**35. SECURITY DEPOSIT:**

- 35.1 Amount towards Security deposit shall be calculated as per details given under Serial No.9 of "APPENDIX TO CONDITIONS OF CONTRACT" in the tender. Security Deposit can be either in Cash or in the form of Bank Guarantee.  
 In case of cash option, the EMD shall be retained as part of Security Deposit and balance Security Deposit shall be accumulated through retention's from Running Account Bills at 7.5% (maximum) of gross amount of bill  
 In case of Bank Guarantee option, the Contractor shall furnish one Bank Guarantee for full amount of Security deposit valid till end of defects liability period OR, two Bank Guarantees of like amounts each equal to half the Security deposit; one valid till virtual completion and the other till end of defects liability period then EMD amount shall be refunded after confirmation of Bank Guarantee..
- 35.2 The Bank Guarantee/s shall be from any Nationalised / Scheduled Bank preferably at place of work site or Zonal Headquarter of LIC within whose jurisdiction the work falls or where a Branch/Division of the Corporation exists.
- 35.3 Bank Guarantee/s (BGs) against Security Deposit (SD) shall be executed as per the specimen pro-forma at Annexure B. Bank guarantee/s against Security Deposit shall be submitted within 10 (ten) days from the date of acceptance letter.
- 35.4 50% of the Security Deposit (cash option) shall be refunded after the certificate of virtual completion is issued to the contractor & provided that the employer has no claim for forfeiture of part or whole of the said deposit.
- 35.5 Balance 50% of Security deposit will be refunded to the contractor after the satisfactory completion of the defects liability period, subject to deductions for any appropriations thereof required to be made by the employer as per the conditions of contract.
- 35.6 If one Bank Guarantee in lieu of total Security Deposit is furnished, the same will be released only after the successful completion of Defects Liability period subject to any appropriations as aforesaid.
- 35.7 If two Bank Guarantees in lieu of Security deposit are furnished, the First Bank Guarantee will be released after the certificate of Virtual completion is issued to the contractor and second shall be released after the satisfactory completion of Defects Liability Period subject to any appropriations as aforesaid.



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- 35.8 Contractor shall keep the Security Deposit, where applicable, replenished to its full value whenever any recovery or appropriation there from occurs. The employer reserves the right to do so from any money(s) due to the contractor laying with them.
- 35.9 The Contractor should note that no interest will be allowed on any part of the Security deposit.
- 35.10 No deductions will be effected from the bills when the total security deposit is paid in the form of Bank Guarantee(s) and the E.M.D shall be refunded after acceptance of Bank Guarantee(s).
- 35.11 In the event of failure by the contractor to submit Bank Guarantee(s) by the specified / extended date, recovery of Security deposit shall be effected from the R.A Bills.
- 35.12** In all cases of Bank Guarantees, there shall be further provision of claim period of 6 months. If the contract period gets extended for any reason whatsoever, the contractor shall obtain the required extensions to the Bank Guarantee(s).

### **36. SETTLEMENT OF DISPUTES, ARBITRATION:**

- 36.1 Any Disputes and Differences of any kind whatsoever arising out of or in connection with the Contract or the carrying out of work (whether during the progress of the work or after its completion and whether before or after determination, abandonment or breach of contract) shall be referred to a Standing Committee consisting of 1. Retired High Court Judge and 2. Members from Engineering fraternity retiring as senior Engineer from Government/ Government Undertaking. The Committee will be constituted by the Chairman, LIC of India.
- 36.2 The claims arising out of the Contract will be placed before the Committee once in a quarter and decision will be conveyed to both the contractually agreed parties.
- 36.3 Either of the Party on being dis-satisfied with the decision may approach to a Three Member Arbitral Tribunal, one each will be appointed by Either Party and 2 appointed Arbitrators will appoint 3rd Arbitrator who will act as Presiding Arbitrator.
- 36.4 Executive Director (Engg.) will appoint the Arbitrator on behalf of LIC of India. The Arbitration shall be conducted in accordance with Arbitration and Reconciliation Act 1996 as amended by the Arbitration and Reconciliation (Amendment) Act 2015 (3 of 2016) and any other amendment thereafter if any.
- 36.5 The Contractually Agreed Parties hereby also agree that the Arbitration under this clause shall be a Condition Precedent to any Right of Action in Law of Court under the Contract.



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## **GENERAL INSTRUCTIONS TO CONTRACTORS FOR BUILDERS WORK**

### **1. DRAWINGS:**

- 1.1** Drawings shall be kept open for inspection at places as mentioned in the letter to the contractor from the Chief Engineer. Drawings generally include the site plan, floor plans, elevations and sections of the proposed work.

### **2. INSPECTION OF SITE:**

- 2.1** The Tenderer shall visit and examine the site of work and satisfy himself as to the nature of the existing roads or other means of communication, the character of the soil and of the excavations, the correct dimensions of the work and facilities for obtaining materials and shall obtain generally his own information on all matters affecting the execution of the work. No extra charge made, in consequence of any misunderstanding or incorrect information on any of these points or on the grounds of insufficient description will be allowed. All expenses incurred by the Tenderer in connection with obtaining information for submitting this tender including his visits to site and efforts in compiling the Tender shall be borne by the Tenderer and no claims for reimbursement thereof shall be entertained.

### **3. WHOLE WORK TO BE COMPLETED IN THE SPECIFIED COMPLETION PERIOD:**

- 3.1** The whole work is to be completed within the completion period stated in the Appendix to Conditions of Contract or the extended date of completion, if any. The Contractor will be required if necessary, to work overtime to complete the work by the stipulated date. No extra will be allowed on the Contract sum for such overtime work.

### **18. TIME AND PROGRESS CHART:**

- 18.1** A time and Progress Chart is attached to this Contract for guidance. The Contractor shall submit a time and progress chart (**CPM/PERT/Quantified Bar Chart**) fitted within the specified overall period of completion (as stated in Appendix to Conditions of Contract) within **10 (Ten)** days of the communication of letter of intent, to the Corporation's Engineer. In case the Contractor does not come forward for any change in the Time and Progress Chart as provided in the General Instruction to the Contractors, it shall be presumed that the Time and Progress Chart is accepted in full in letter and spirit to maintain the pace of the progress of the Work.
- 18.2** Ancillary work should be so started that all such work is completed before the specified overall contractual period of completion.



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**18.3** The Contractor shall assume full responsibility for any delay in delivery of materials by Merchants or nominated Sub-Contractors not having completed the work in accordance with the Time and Progress Chart. Such excuses shall not form any criterion for extension of time, or any claims by the Contractor.

**18.4** Any failure on the part of the contractor to adhere to the starting and completion date of individual items mentioned in the chart shall entail application of the liquidated clause on whole or part at the discretion of the Chief Engineer, notwithstanding the overall period of completion stated in the appendix to the conditions of contract.

**5. BENCHES:**

**5.1** The Contractor is to construct and maintain proper benches to indicate the inter-section of all main walls in order that the lines and levels may be accurately checked at all times. The Contractor shall provide suitable stones with flat tops and build the same in concrete for temporary or permanent benchmarks. All the pegs for setting out the work and fixing the necessary levels required for the execution thereof shall, if desired by the Corporation's Engineer likewise, be built in masonry at such places and in such a manner as the Corporation's Engineer may determine. Contractors' rates shall cover for these factors.

**6. DRAWINGS ON SITE:**

**6.1** The Drawings maintained on the site are to be carefully mounted on boards of appropriate size and covered with a coat of approved transparent varnish or laminated at the cost of the Contractor. They are to be protected from the ravages of termites, ants, silver fish and other insects.

**7. ORDER OF WORK:**

**7.1** The Chief Engineer reserves the right to fix the order in which the various items of work involved in this Contract is to be executed and Contractor shall comply with the same. There shall be no extra claims on account of this.

**8. WORKMANSHIP:**

**8.1** The Work calls for a high standard of workmanship combined with speed.



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**9. REJECTED WORKMANSHIP OR MATERIALS:**

9.1 Any workmanship, or materials not complying with the specific requirements or approved samples, or which have been damaged, contaminated or deteriorated, must be removed immediately from the site and replaced at the Contractor's expense as directed.

**10. QUOTED RATES:**

10.1 The rate is percentage tender.

**11. WATCHING AND LIGHTING:**

11.1 The Contractor from the time of being placed in possession of the site must allow for watching, lighting and protecting the work, the site and surrounding, properly by day and night on all days including Sundays or other holidays, at his own cost.

**12. WATER:**

12.1 The rates quoted by the Contractors shall include for providing all water required for the work including that required by special tradesmen and Sub-Contractors and pay all charges required by Local Municipal or other Authorities. Water must be clean, fresh, pure and free from earth, vegetable or organic matters, acid or alkaline substance in solution or suspension. The Contractors shall make their own arrangements for water supply. If supply from the Municipality or other local bodies be inadequate, the Contractor should provide tube well or wells or open well at his own cost. The Contractors must execute any temporary plumbing and pay all fees and charges. All health regulations in force shall be strictly observed by the Contractor and pay all necessary charges. However, water is available in surplus with LIC, the same may be permitted for use in work and in such case necessary recovery will be effected from contractor's bill as detailed below:

**Recovery of water charges from Contractors bill if used from LIC source @ 0.25% of the Gross value of work done..**

**13. ELECTRICITY:**

13.1 The Contractor shall arrange with the concerned Electricity Supply Authorities for a temporary meter and supply to the site and shall provide all temporary wiring, power and lighting points for the whole of the works and clear away when no longer required. He shall pay all charges for the same and for electricity consumed, including that consumed by Sub-Contractors. **The Contractor should submit disconnection & no dues certificate from the supplying authority along with his final bill.**



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However, where existing source of Electricity is available in surplus with LIC, the same may be permitted for use in work and in such case necessary recovery will be effected from contractor's bill as detailed below:

**Recovery of Electricity charges from Contractors bill if used from LIC source @ 0.25% of the Gross value of work done..**

**14. OFFICE FOR CORPORATION'S ENGINEER ON SITE: (DELETED)**

14.1 The Contractor shall at his cost, provide a separate office (of suitable size) for the Corporation's Engineer/s on site with writing tables, chairs, electric lights and fans, drinking water arrangements, etc. as directed by the Executive Engineer and clear away at completion of work and make good all work disturbed and pay all charges. The Contractor shall also provide facilities for having the Corporation Engineer's office cleaned every day and kept in good and hygienic condition.

**15. OFFICE ACCOMMODATION FOR CONTRACTOR'S STAFF :**

15.1 The Contractor shall, at his cost, provide, fit-up and maintain in an approved position proper office accommodation for his representative and staff, which offices shall be open at all reasonable hours to receive instructions, notices or communications and clear away on completion and make good all work disturbed.

**16. SECURITY AND PROTECTION:**

16.1 The Contractor shall at his cost, provide any necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials and for altering and adapting same as may be required and removing at completion of the works and making good all works disturbed.

16.2 During inclement weather, the Contractor shall suspend concreting or plastering for such time as the Corporation's Engineer may direct and shall protect such work in course of execution from damage by approved measures.

16.3 Should the work be suspended by reason of rain, strike, lock-outs or any other cause, the Contractor shall at his cost take all precautions necessary for the protection of the work and shall make good any damage arising from any of these causes.

16.4 The Contractor shall at his expense cover-up and protect from injury from any cause, all new work and supply all temporary doors protection to windows, and any other requisite protection for the whole work executed, whether by himself or special tradesmen of Sub-Contractors and any damage caused must be made good by the Contractor at his own expense.



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- 16.5 All fences, trees, shrubs, grasses, lawn and other surfaces around the buildings or approaches thereto, which are required to be maintained are to be kept free from damage due to operations in connection with the work, at Contractor's expense.
- 16.6 The Contractor shall, at his expense, protect all projecting sills, jambs, copings, stone or concrete treads and mouldings and all concrete steps, wood work and joinery and the like from injury during the progress of the work.
- 16.7 The Contractor shall at his cost, protect joinery and make good all damages to the same from any cause whatsoever during the performance of the Contract and leave perfect to the satisfaction of the CE at completion. Before giving possession, the Contractor must see that all doors, windows and ventilation etc. work easily and shall make all necessary adjustments for such smooth working.
- 17. SANITATION:**
- 17.1 The Contractor shall at his cost provide adequate latrine facilities and keep the same in a clean and hygienic condition to the satisfaction of the Public Health Authorities and shall cause such latrine and night soil to be cleared away whenever necessary and shall make good all works disturbed by these conveniences.
- 18. MINIMUM WAGES ACT:**
- 18.1 The Contractor shall pay rates of wages and observe hours of work and conditions of employment to existing rules under Minimum Wages Act. Further, it shall be Contractor's responsibility to ensure that he pays his workmen wages, which are not lower than the minimum prescribed by the Union Government and State Government in which area this Contract, is being operated.
- 19. SHEDS FOR MATERIALS:**
- 19.1 The Contractor shall at his cost provide and maintain proper approved sheds for the storage and protection of materials etc. and other work that may be executed on the site including the tools and materials of Sub-Contractors and remove on completion. Sheds for storage of Cement are to have floors raised from the ground.
- 20. TEMPORARY ROADS:**
- 20.1 The Contractor shall, at his expense, provide such temporary roads on the site as may be necessary for the proper performance of the Contract and for his own convenience but not otherwise. Upon completion, such roads shall be broken up and levelled where so required by the Drawings at Contractor's expense unless the CE shall otherwise direct.



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**21. OBJECTS OF VALUE AND ANTIQUITY FOUND ON SITE:**

**21.1** All objects of value or antiquity found on the site shall remain the property of the Employer and such findings shall be immediately reported to the Chief Engineer.

**22. WORKS AND SITE TO BE KEPT AND DELIVERED UP CLEAN:**

**22.1** All shavings, cuttings and other rubbish as it accumulates from time to time during the progress of the work and at completion, including that of Sub-Contractor and special tradesman to be cleared and carted away. All rejected materials shall be removed. Contractor's quoted rates shall allow for these factors.

**23. USEFUL EXCAVATED MATERIALS:**

**23.1** Any sand, gravel, moorum or rock taken from excavation will remain the property of the Employer and in the event of it not being allowed to use in the work, the Employer reserves the right to dispose it off in any way he wishes or to direct the Contractor to cart it away as ordinary materials.

**23.2** Should suitable sand or gravel or moorum or rock be found in the excavations and the Contractor be allowed to use the same in the work, in place of materials to be brought by him from outside he will be required to pay the Employer the full market value of the same.

**24. SIGN BOARD AND HOARDINGS:**

**24.1** The Contractor shall not affix or place any placards or advertisement of any description or permit the same to be affixed or placed in or upon any hoarding, gantry, buildings or structure other than that approved by the Chief Engineer.

**25. SCIENTIFIC AND MEASURING INSTRUMENTS:**

**25.1** Theodolite, levelling instruments, prismatic compass/chain, steel and metallic tapes and all other surveying instruments found necessary on the works, shall be provided by the Contractor at his expense for the due performance of this Contract as instructed by the Corporation's Engineer.



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**26. TOOLS FOR MASONS:**

**26.1** Every bricklayer or plasterer on the work shall be provided with suitable level, battens, trowels, wooden floats and breaking hammers for cutting bricks and templates, to enable him to carry out the work in a neat and workman like manner and each gang of brick layers or plasterers not exceeding six in number shall be provided with a suitable measuring rule, a plumb bob, a spirit level and a square in addition to the above mentioned, all to be to the approval of the Site Engineer.

**27. CONTRACTOR'S MISTRIES AND SUPERVISORS:**

**27.1** The Contractor's Masson and the Supervisors on the works shall carry with them a suitable measuring rule, a measuring tape, a spirit level, a plumb bob and a square and shall check the work of the bricklayer, plasterers, and carpenters and joiners to see that the work is being done according to the Drawings and Specifications. The Corporation's Engineer/Supervising Staff will use any and all measuring instruments or tools belonging to the Contractor as he chooses, while checking the work executed or being executed on the works.

**28. NO OVERLOADING OF SLABS: (DELETED)**

**28.1** Floors of buildings under construction shall not be loaded by stacks of materials during construction without the prior approval of Corporation's Engineer. It is important that no load comes on the reinforced concrete floors until they are at least three weeks old and at no time must the load placed upon them exceed the load for which they are designed.

**29. ALTERNATIVE ITEMS:**

**29.1** In regard to alternative items, if any, specified in the Schedule of Quantities, Contractor should note that the Employer reserves the right to order the Principal item or its alternatives at the CE's discretion.

**30. ATTENDANCE ON SUB-CONTRACTORS:**

**30.1** Co-ordination: The Contractor shall be responsible for the co-ordination of all the work including that of Sub-Contractors, for arranging runs of all services and working to the requirements and layout of the specialist trades, in all matters necessary for the complete execution of the work.



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- 30.2** Rates quoted by the Contractor shall be inclusive of all attendance on Sub-Contractors or other Contractors nominated by the Employer. Contractor must allow for provision of the use of his scaffolding to Sub-Contractors and for its retention until such time all relevant Sub-Contract works are completed.
- 30.3** The Contractor shall accept liability for and bear the cost of the supply of all necessary water, electricity, lighting, watching etc. for the Sub-Contractors work.
- 30.4** The Contractor must allow in his rates for making good any holes and chases left by the Sub-Contractors or other Contractors nominated by the Employer before the Builder's Work is completed and handed over
- 30.5** The Contractors shall, at all times, give access to workmen employed by the local or other authorities or any men directly employed on the buildings and to provide such parties with proper, sufficient, and if required, special scaffolding, hoists and ladders and provide them with water and lighting, and leave or make any holes, grooves etc. in any work directed by the Chief Engineer, as may be required, to enable such workmen to lay or fix pipes, electric wiring, special fittings etc. Contractor's quoted rates shall allow for these factors.
- 31. OCCUPATION BY EMPLOYER:**
- 31.1** The Employer reserves the right to occupy the works by sections as completed, as may be considered by the Chief Engineer both practicable and reasonable and without hindrance to the Contractor's progress.
- 32. TAXES, DUTIES, LEVIES AND DEDUCTION AT SOURCE:**
- 32.1** The Contractors shall be responsible to pay all statutory levies/taxes imposed by the State and Central Government from time to time. It is deemed that the rates quoted by the contractor for each item of works includes all applicable taxes except GST on works contract which shall be paid by LIC as applicable from time-to-time as per notification of Government of India.
- 32.2** Deduction at source of Income tax, all other statutory taxes as applicable and labour cess shall be made by LIC of India as per statutory provisions prevailing from time to time, from the running account/ final bill and remitted to the concerned taxation authorities / State Government on behalf of the contractor.



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**32.3 The contractor shall mention the following LIC of India GSTIN Number according to State of work site in their bill.**

**FOR WEST BENGAL GSTIN NUMBER : 19AAACL0582H1ZJ**

32.4 The vendor needs to display the Invoice on the GST portal and remit the tax to the Govt. Within specified period.

32.5 The measurement books along with the abstract are to be checked, corrected and accepted by the vendor and then only Invoice with zero correction will be raised and uploaded by the vendor on GST portal.

32.6 The vendor should quote their rate considering all taxes/duties/levies/labour welfare cess etc which are not subsumed in GST but excluding GST on works contract as applicable which will be paid extra at the rate prevailing at the time of billing. It is also advised to quote the rate considering the input tax credit advantage and adjusting/deducting the same in the quoted rate/amount.

32.7 GST on works contract will be paid extra along with Bill payment as per applicable rate of GST at the time of billing.



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**ANNEXURE –‘A’**

**PROFORMA FOR ARTICLES OF AGREEMENT**

ARTICLES OF AGREEMENT made at.....this.....day of .....20..... between THE LIFE INSURANCE CORPORATION OF INDIA, a body corporate constituted and established by the Life Insurance Corporation Act, 1956 (Act 31 of 1956) and having its Central Office at "Yogakshema", Jeevan Bima Marg, Mumbai and its Zonal Office at ..... hereinafter called the Employer (which expression shall include its successors and assignees wherever context or meaning shall so require or permit) of the one part and M/s .....( hereinafter called "**The Contractor**" ) of the other part.

WHEREAS the Employer is desirous of constructing the.....

and has prepared drawings and specifications and the Schedule of Quantities which have been signed by or on behalf of the parties hereto.

AND WHEREAS the Contractor has agreed to execute upon and subject to the conditions and instructions set forth herein ( hereinafter referred to as "**the said Conditions**") the works shown upon the said drawings and /or described in the said Specifications and included in the said Abstract Schedule of Quantities at the item rates therein set forth amounting to the contract sum of Rs..... hereinafter referred to as "**the said contract Amount**".

**NOW IT IS HEREBY AGREED AS FOLLOWS:**

1. In consideration of the said Contract Amount to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said Conditions execute and complete the works shown upon the said Drawings and described in the Specifications and/or the priced Schedule of Quantities.
2. The Employer shall pay the contractor the said Contract Amount or such other sum as shall become payable for the items and in the manner hereinafter specified in the said conditions.
3. The said Conditions and Appendices thereto shall be read and construed as forming part of this Agreement, and the parties hereto shall respectively abide by and submit themselves to the conditions and perform the Agreement in their part respectively in such conditions contained.
4. All disputes arising out of or in any way concerned with this Agreement shall be deemed to have arisen in \_\_\_\_\_ and only the Courts in \_\_\_\_\_ shall have jurisdiction to determine the same.



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- 5. The contract comprises :-
i) Tender Documents Serial Pages.....
ii) Subsequent Correspondence Serial Pages.....
iii) Architectural Drawings Serial Pages .....
6. Only ( ) alterations have been made in these documents and as evidence that these alterations were made before the execution of Contract Agreement, they have been initialed by the contractor and.....
7. IN WITNESS WHEREOF THE Official seal of the LIFE INSURANCE CORPORATION OF INDIA, ZONE, was thereto affixed and signed on its behalf by the Chief Engineer and by on behalf of the Contractor/s on the dates respectively mentioned against their signatures in the presence of the witnesses whose signatures are also appended.

In the presence of

CHIEF ENGINEER

1. Signature : .....

FOR AND ON BEHALF OF THE LIFE INSURANCE CORPORATION OF INDIA

Name : .....

Address : .....
.....

Date : .....

2. Signature : .....

Name : .....

Address : .....
.....

In the presence of .....

1. Signature : .....

FOR AND ON BEHALF OF THE CONTRACTOR M/S .....

Name : .....

Address : .....
.....

Date : .....

2. Signature : .....

Name : .....

Address : .....



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 "HINDUSTHAN BUILDING", 4, C.R. AVENUE, KOLKATA – 700072  
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ANNEXURE – 'B'

**LIFE INSURANCE CORPORATION OF INDIA**

(Refer Clause No. 35 of Conditions of Contract)

**FORM OF BANK GUARANTEE IN LIEU OF SECURITY DEPOSIT**

**IN INDIVIDUAL CONTRACTS**

To

THE LIFE INSURANCE CORPORATION OF INDIA

In consideration of the Life Insurance Corporation of India having its \_\_\_\_\_ Zonal Office at \_\_\_\_\_ in the State of \_\_\_\_\_ (hereinafter called '**the Corporation**') which expression shall unless repugnant to the subject or context include its successors and assignees) having agreed under terms and conditions of contract (vide its acceptance letter No. \_\_\_\_\_ dated \_\_\_\_\_) made between \_\_\_\_\_ (hereinafter called the said Contractor) and the Corporation in connection with \_\_\_\_\_ (hereinafter called '**the said contract**') to accept a Deed of Guarantee and Indemnity as herein provided for Rs. \_\_\_\_\_ from the \_\_\_\_\_ in lieu of the Security Deposit to be made by the contractor and/or in lieu of the deduction to be made from the Contractor's bills, for the due fulfillment by the said contractor of the terms and conditions contained in the said contract, we the \_\_\_\_\_ (hereinafter referred to as '**the said Bank**') and having our office at \_\_\_\_\_ do hereby undertake and agree to indemnify and keep indemnified the Corporation from time to time to the extent of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) against any loss or damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation by reason of any breach or breaches by the said contractor in respect of the said contract or of any of the terms and conditions contained in the said contract, or in respect of all its claims for money and / or material found due and recoverable from the said contractor and to unconditionally pay the amount claimed as such by the Corporation on demand and without demur to the extent aforesaid.

2. We, the said Bank further agree that the Corporation shall be the sole judge of and as to whether the said contractor has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation from time to time on account thereof and the decision of the Corporation in this respect shall be final and binding on us.

CONTRACTOR

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CHIEF ENGINEER



**LIFE INSURANCE CORPORATION OF INDIA**  
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3. The Corporation shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or Indemnity from time to time to vary any of the terms and conditions of the said contract or to extend time of performance by the said contractor, or to postpone for any time and from time to time any of the powers exercisable by it against the said contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the said Contract or securities available to the Corporation and the said Bank shall not be released from its liability under these presents by any exercise by the Corporation of the liberty with reference to the matters aforesaid or by reason of time being given to the said contractor or any other forbearance, act or omission on the part of the Corporation or any indulgence by the Corporation to the said contractor or of any other matter or thing whatsoever, which under the law-relating to sureties would but for this provision have the effect of so releasing the Bank from its liability.

4. It shall not be necessary for the Corporation to proceed against the contractor before proceeding against the Bank and the Guarantee and Indemnity herein contained shall be enforceable against the said Bank, notwithstanding any security which the corporation may have obtained or obtain from the contractor shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealized.

5. Notwithstanding anything contained in any of the foregoing clauses the liability of the Bank under this Guarantee shall not exceed Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only). The guarantee shall remain in force till \_\_\_\_\_. If any extension of time be granted to the contractor, we undertake to extend the guarantee with the consent of the contractor. Unless a claim or demand under this guarantee is made or presented to the Bank within six months from the expiry date, all the rights of the Corporation under this Guarantee shall cease and the Bank shall be released and discharged from all liability hereunder.

6. We, the said bank lastly undertake not to revoke this guarantee and indemnity during its currency except with the previous consent of the Corporation in writing and agree that any change in the constitution of the said contractor or the said Bank shall not discharge our liability hereunder.

For and on behalf of the Bank

(Name and Designation)

The above Guarantee is accepted by the  
LIFE INSURANCE CORPORATION OF INDIA.

For and on behalf of the LIC of India

(Name and Designation)

Dated:



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**Note No.1 \* : FILL IN AS APPLICABLE**

**A) For Proprietary concerns:-**

Shri \_\_\_\_\_ son of \_\_\_\_\_ resident of \_\_\_\_\_ carrying on business under the name and style of \_\_\_\_\_ at \_\_\_\_\_ (hereinafter called '**the said contractor**' which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representative).

**OR**

**B) For Partnership concerns:-**

1. Shri \_\_\_\_\_  
 son of \_\_\_\_\_  
 resident of \_\_\_\_\_

2. Shri \_\_\_\_\_  
 son of \_\_\_\_\_  
 resident of \_\_\_\_\_

\_\_\_\_\_ carrying on business in partnership under the name and style of \_\_\_\_\_ of \_\_\_\_\_ at \_\_\_\_\_ (hereinafter collectively called '**the contractor**' which expression shall unless the context requires otherwise include each of them and their respective heirs, executors, administrators and legal representatives)

**OR**

**C) For companies :-**

M/S / Shri \_\_\_\_\_ a company under the Companies Act 1956 and having its registered office at \_\_\_\_\_ in the state of \_\_\_\_\_ (hereinafter called '**the said contractor**' which expression shall unless the context requires otherwise include its successors and assignees).

**Note No.2:**

**\*\* Please fill in the name and address of Bank.**



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## SPECIFICATIONS FOR BUILDER'S WORK

### 1. EXCAVATION AND EARTHWORK

#### 1.01 GENERAL :

The excavation will generally refer to open excavation of foundation (including basement if necessary) wet or dry.

#### 1.02 EXAMINE THE SITE :

The Contractor shall visit and ascertain the nature of the ground to be excavated and the work to be done and shall accept all responsibility of the cost of the work involved.

#### 1.3 CLEARING THE SITE :

The site on which the structure is to be built shown on the drawing and the area required for setting out and other operations like roads, drains, sheds, etc. should be cleared and all obstructions, loose stones, materials and rubbish of all kinds, slumps, bush wood and trees removed as directed, roots being entirely grubbed up. The materials obtained will be the property of the LIC and materials considered useful by the Corporation's Engineers will be handed over to the LIC. Rejected materials will be removed by the Contractor to his own dump at his own cost.

#### 1.4 GROUND LEVELS AND SITE LEVEL PLAN :

Before starting the excavations, the requisite block levels of the entire plot shall be taken by the Contractor in consultation with the Corporation's Engineer and a proper record of these levels kept, which shall be jointly signed by the Contractor and the Corporation's Engineer. A block level plan showing all the ground levels of the plot shall be prepared and shall be jointly signed by the Contractor and the Corporation's Engineer.

#### 1.05 SETTING OUT :

After clearing the site, and preparing the site level plan, the Contractor will set out the centre lines of the building or other involved works and get the same approved from the Corporation's Engineer. It shall be the responsibility of the Contractor to install substantial reference marks, bench marks etc. and maintain them as long as required by the Corporation's Engineer. The Contractor will assume full responsibility for proper setting out, alignment, elevation and dimension of each and all parts of the work.



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## **1.06 EXCAVATION AND PREPARATION OF FOUNDATION FOR CONCRETING**

Excavation shall include removal of all materials of whatever nature at all depths and whether wet or dry necessary for the construction of foundation and sub-structure (including mass excavation for basements where applicable) exactly in accordance with lines, levels, grades and curves shown on the drawings or as shall be levelled both longitudinally and transversely or stepped as directed by the Corporation's Engineer.

Should the Contractor excavate to a greater depth or width than shown on the drawings or as directed by the Corporation's Engineer, he shall at his own expense fill the extra depth or width with cement concrete in proportion as directed by the Corporation's Engineer but in no case with concrete of mix leaner than 1:4:8 cement concrete.

The contractors shall report to the Corporation's Engineer when the excavations are ready to receive concrete. no concrete shall be placed in foundations until the Contractor has obtained the Corporation's Engineer's approval. In case, the excavation is done through different strata of soil and if the same is payable as per provision in the schedule of quantities, the Contractor shall get the dimensions of the strata payable decided from the Corporation's Engineer. if no specific provision is made in the schedule of quantities it will be presumed that excavation shall be in all types of soil and the Contractors rate shall cover for the same. After the excavation is passed by the Corporation's Engineer (and before laying the concrete) the Contractor shall get the depth and dimensions of the excavations and levels (and nature of strata if applicable as per schedule of quantities like hard rock, soft rock etc.) and measurements recorded from the Corporation's Engineer on site. Refer I.S. 1200(Part-1)-1969 for classification of excavated material. Chief Engineer's interpretation regarding classification shall be final and binding on the Contractor. Excavated rock/boulders could be used for soling if approved by S.E./Executive engineer. Recovery at the market rate shall be made based on stack measurement after deducting 30% for voids.

## **1.07 SHORING :**

The sides of the excavations should be timbered and shored in such a way as is necessary to secure them from failing in and the shoring shall be maintained in position as long as necessary. The Contractor shall be responsible for the proper design of the shoring to hold the sides of the excavation in position and ensure safety from slips and prevent damage to work and property and injury to persons. The shoring shall be removed as directed after the items for which it is required are completed.



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#### 1.08 **PROTECTION** :

All foundation pits, lift pits, well pits and similar excavations shall be strong fenced and marked with red lights at night to avoid accidents. Adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, property and the people in the vicinity shall be taken by the Contractor at his own cost, he being entirely responsible for any injury and damage to property caused by his negligence or accident due to his construction operations.

#### 1.9 **STACKING OF EXCAVATED MATERIALS** :

All materials excavated will remain the property of the L.I.C. and rate for excavation includes sorting out of useful materials and stacking them on site as directed. Materials suitable and useful for backfilling, plinth filling or leveling of the plot or other use shall be stacked in convenient place but not such a way as to obstruct free movement of men, animals and vehicles or encroach on the area required for constructional purposes.

#### 1.10 **BACK FILLING** :

All shoring and form work shall be removed after their necessity ceases and trash of any sort shall be cleaned out from the excavation. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface with approved excavated materials in layers 15 cm to 20 cm, in thickness, watered and rammed. The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure. Where suitable excavated material is to be used for refilling, it shall be brought from the place where it was temporarily stacked and used in refilling. No excavations or foundations shall be filled in or covered up until all measurements of excavations, masonry concrete and other works below ground level are jointly recorded. Black cotton soil shall not be used for back filling or in plinth filling.

#### 1.11 **DEWATERING** :

Rate for excavation shall include bailing or pumping out water which may accumulate in the excavation during the progress of work either from seepage, springs, rain or any other cause and diverting surface flow if any by bunds or other means. pumping out water shall be done in such approved manner as to preclude the possibility of any damage to the foundation trenches, concrete or masonry or any adjacent structure.



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When water is met in foundation trenches or in basement excavations pumping out water shall be from an auxiliary pit of adequate size dug slightly outside the building excavations. The depth of the auxiliary pit shall be more than the working foundation trench levels. The auxiliary pit shall be refill with approved excavated materials after the dewatering is over.

The excavation shall be kept free from water (1) during inspection and measurement. (2) when concrete and/or masonry are in progress and till they come above the natural water level, and (3) till the Corporation's Engineer considers that the concrete/mortar is sufficiently set.

#### **1.12 SURPLUS EXCAVATED MATERIAL :**

All excavated materials certified as surplus and not useful shall be removed by the Contractor from the site in an approved manner to his own dump at his own cost.

#### **1.13 RATES TO INCLUDE :**

Apart from other factors mentioned elsewhere in this contract; rates for the item of excavation shall also include for the following:

- i. Clearing site
- ii. Setting out works as required and setting up bench marks and other reference marks.
- iii. Providing shoring and strutting and subsequently removing the same.
- iv. Bailing and pumping out water as required and directed.
- v. Excavation at all depths (unless otherwise specified in the schedule of quantities) and removal of all materials of whatever nature wet or dry and necessary for the construction of foundation/basement etc. and preparing bed for laying concrete.
- vi. Sorting out useful excavated materials and conveying beyond the structure and stacking them neatly on the site for back filling or re-use as directed.
- vii. Back filling the trenches alongside masonry or concrete with approved excavated material up to the natural ground level including watering and ramming.
- viii. Necessary protection including labour materials and equipment to ensure safety and protection against risk or accident.
- ix. Removal of surplus excavated material as directed to Contractors own dump.
- x. Drilling of small holes as directed to explore the nature of substratum if necessary.



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#### 1.14 **MEASUREMENTS FOR EXCAVATION :**

Excavation for foundation of columns, beams, walls and the like shall be measured and paid net as per drawing dimensions of concrete (bed concrete where so specified) at the lowest levels in regard to length and breadth and depth shall be computed from the concerned excavation levels and ground level taken before excavation. Any additional excavation required for working space, form work, planking, dewatering and strutting etc. shall not be measured and paid for separately but rates quoted for excavation shall include for all these factors. No increase in bulk after excavation shall be made.

#### 1.15 **EARTH FILLING IN PLINTH :**

If there is approved surplus earth after back filling the sides of excavations, the same will be used for plinth filling if required. Any additional approved earth if required for plinth filling the same shall be brought on to the site by the Contractor from outside. No borrow pits shall be opened on the site. Filling in plinth shall be done in layers of 15cm to 20cm thick, each layer being consolidated by ramming and watering. Black cotton soil shall not be used for plinth filling.

Filling in plinth shall be measured net as in position after consolidation height or depth of filling being measured from original ground level to top of earth filling after consolidation.



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## **SPECIFICATION FOR CONCRETE**

### **2. CONCRETE AND STEEL REINFORCEMENT CEMENT CONCRETE :**

#### **2.1 GENERAL :**

P.C.C. shall mean plain cement concrete.

R.C.C. shall mean Reinforced cement concrete.

**2.2** Constant and strict supervision of all items of the construction is necessary during the progress of work, including proportioning, mixing and placing of concrete. Supervision is also extremely important in checking the reinforcement and its placing, before being covered.

**2.3** Contractor shall finalize the details in consultation with the Clerk-of works as per which from work is proposed to be carried out and also the details of planning of concreting operations including adequacy of acceptable materials, testing of mixer and vibrator for ascertaining that they are in working condition, availability of test cube moulds, slump test apparatus etc.

#### **2.4 SAMPLES AND TESTS:**

Every facility shall be provided to enable the Corporation's Engineers to obtain samples and carry out tests on the materials and construction. If these tests show that any of the materials or construction do not comply with the requirements of this specification, the Contractor will be responsible for the costs of the test and the replacement of the defective materials and/or construction.

#### **2.5 REJECTED MATERIALS:**

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

#### **2.6 LOADING OF FLOOR SLABS:**

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



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## 2.7 CO-ORDINATION :

The Contractor shall be responsible for the co-ordination with sub-contractors or other contractors for incorporating any inserts or electrical conduit pipes, fixing blocks, chases, holes etc. in concrete members as required. The Contractor shall ensure that these requirements have been approved by the Corporation's engineer before concreting operation are put in hand. All fixing blocks, chases, inserts, holders, etc. to be left in the concrete shall be of sizes specified and be accurately set out and placed before pouring concrete. The Contractor's rates quoted for concrete items shall include for all these factors. Holes or chases shall not be out in concrete without prior approval of the Corporation's Engineer.

## 2.8 INSERTS IN CONCRETE :

Contractor should note that he shall provide necessary wooden lugs, sleeves, etc. for his own works to be made for which no extra payment will be made. He will have to provide if so directed, any inserts, wooden lugs, sleeves for other contractor's work such as Electrical Contractor, plumbing Contractor, A.C. Contractor, Contractor of lifts , etc. for which he will be entitled for payment but in case the other contractors provide such inserts, then he will have to take proper measures (at his expense) and take care not to disturb the work while laying concrete.

2.9 Contractor shall provide work-site-testing equipment for aggregate and concrete such as test sieves, balances, slump cones, test cube moulds etc.

## 2.10 MATERIALS : ALL MATERIALS SHALL BE OF APPROVED QUALITY.

### 2.11 CEMENT :

- a. Ordinary port land cement shall conform to the I.S. specification I.S:269/1976. Portland Pozzolana cement shall confirm to I.S. 1489-1976. Portland slag cement shall confirm to I.S. 456-1989.
- b. The cement shall be stored in such a manner as to permit of easy access for proper inspection, in a suitable weather-tight building to protect the cement from dampness and to minimize warehouse deterioration. The shed shall be built at the cost of the Contractor. Care shall be taken to see that (i) there is no leakage from side walls and (ii) windows are not provided. The plinth level of the shed shall be raised and the surrounding ground shall drain the surface water away from the shed. The floor of the shed shall consist of wooden planks resting on a base prepared of dry bricks laid on edge. The bags should not be piled against



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the wall. A space of 30cm shall be left all around between exterior walls and piles. The bags shall be placed closed together in the pile to reduce circulation of air as much as possible. The bags should not be piled more than 10. the bags shall be arranged in header and stretcher fashion so as to lessen the danger of toppling.

When removing the bags for use, "First in, first out" rules shall be applied. For this purpose, consignment as it comes in for storage shall be stacked separately and a placard bearing date of arrival shall be pinned to the pile.

- c. Contractor shall be fully responsible for the quality of cement brought at the work site. The contractor shall satisfy himself that the cement brought to the work site conforms to the requirements of I.S. : 269/1976 or relevant Indian Standard and shall procure manufacturer's certificate to this effect. In his own interests. In case the Contractor has any doubt regarding the quality of cement brought on work site it is up to him to have it tested at his own expenses and make sure that cement is of right quality.
- d. In case Corporation's Engineer gets any doubt about quality of cements he can order the contractor to have cement tested or he can take sample in the presence of contractor from cement bags stored at work site and forward them to a government approved laboratory for testing. In respect of charges for testing in such a case, contractor will be paid the charges, provided the cement conforms to the specified I.S. Standards.
- e. Cement concerning which there is doubt, shall not be used pending testing and satisfactory results. All cement not conforming to specifications and rejected by Corporation's Engineer and cement that is stored at site for a period long than three months and deteriorated, damaged or set shall not be allowed to be used All such cement shall be immediately removed from work site by the contractor. The cost of all such cement shall be borne by the contractor.

## **2.12 AGGREGATES:**

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

## **2.13 FINE AGGREGATE :**

- a. The fine aggregate-sand shall be hard, strong, dense, durable, clean with uncoated grains. The maximum size of the particles shall be 4.75mm(3/16in.) and shall be graded down. The sand shall not contain any harmful material such as iron pyrites, coal mica, silt, clay, alkali, sea shells, organic impurities, loam etc. or in case of reinforced concrete work, any material which might attack the reinforcement or which might be detrimental to concrete. Aggregates



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which are chemically reactive with the alkalis of the cement, shall not be used, the maximum quantity of deleterious material shall not exceed the limits specified in the relevant I.S specification. Silt and dust present in natural sand shall be limited to 3% by weight. in case it is more than 3%, it shall be washed at site. Presence of mica in sand shall not be more than 1% by weight.

- b. Grading: The natural sand used for work shall have a grading conforming to one of the three grading zones given in following table (Table IA):-

**TABLE 'IA'**

**GRADING OF FINE AGGREGATES**

(In accordance with IS:2386/1963 Part-1) percentage passing for

Sieve	Zone-1	Zone-2	Zone-3
10 mm	100	100	100
4.75 mm	90 - 100	90 - 100	90 -100
2.36 mm	60 - 95	75 - 100	85 -100
1.18 mm	30 - 70	55 - 90	75 -100
600 micron	15 - 34	35 - 59	60 - 79
300 micron	5 - 20	8 - 30	12 - 40
150 micron	0 - 10	0 - 10	0 - 10

When grading falls outside the limits of any particular zone of sieves, (other than 600 micron IS Sieve) by a total amount not exceeding 5% it shall be regarded as falling within the grading zone.

**2.14 COARSE AGGREGATES :**

- a. Coarse aggregates shall consist of hard, dense, durable, uncoated crushed rock. Gravel aggregate shall be allowed to be used only if specially specified in the schedule of quantities. Otherwise, it shall be taken that only crushed rock from an approved quarry shall be permitted as coarse aggregates.
- b. The aggregates shall be from soft, friable, thin or long laminated pieces. Aggregates shall be free from injurious amounts of alkali, organic matter and other deleterious materials. Flaky or weathered stones shall not be used. The maximum percentage of deleterious materials shall not exceed those specified in the relevant I.S. specifications.



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- c. In selecting the aggregate, the contractor shall satisfy that the source is suitable for regular supply and a watch shall be maintained that the particle shape and grading remain reasonably uniform throughout the progress of work.
- d. Contractor shall arrange to supply coarse aggregates in single sizes, conforming in the case of each nominal size, to the grading given in the following table (Table 1B) under column "A", the single sizes shall be combined in suitable proportions to get desired overall grading of aggregates. The Corporation's Engineer, at his discretion may allow the used of "Graded Aggregates" of nominal size, to conform to the grading in the limits specified in the Table-1B under column "B".

**TABLE 1- B COARSE AGGREGATES**

COLUMN "A"

COLUMN "B"

**Percentage passing for single sized aggregates**

**Percentage passing for graded aggregates**

IS sieve Mm	63mm	40mm	20mm	16mm	12.50m m	10mm	40mm	20mm	16mm	12.50mm
80	100	-	-	-	-	-	100	-	-	-
63	85-100	100	-	-	-	-	-	-	-	-
40	0-30	85-100	100	-	-	-	95- 100	100	-	-
20	0-5	0-20	85-100	100	-	-	30-70	95- 100	100	100
16	--	-	-	85- 100	100	-	-	-	90- 100	-
12.50	-	-	-	-	85-100	100	-	-	-	90-100
10	0-5	0-5	0-20	0-30	0-45	85- 100	10-35	25-55	30-70	40-85
4.75	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36	-	-	-	-	-	0-5	-	-	-	-



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- e. Size of Aggregates:-
- (i) Nominal maximum size of aggregates in beams and columns should be restricted to 5mm less than the minimum clear distance between the main bars or 5mm less than the minimum cover to the reinforcement whichever is less.
  - (ii) Where reinforcement is widely spaced as in slabs, nominal maximum size of aggregate of 20mm may be used.
  - (iii) In no case the maximum size of aggregate to be greater than one quarter of the minimum thickness of the member so as to facilitate concrete to be placed without difficulty to surround all reinforcement.
  - (iv) Generally on reinforced concrete work, nominal maximum size of 20 mm is considered suitable.
- f. Grading: It can be assumed as a rough guide that from 45percent to 75 percent of the total aggregate (fine plus coarse) shall pass through a sieve of aperture size equal to one half of the maximum size of coarse aggregate.
- g. Stock-piling of aggregate or storage of aggregates: Aggregates shall be stored at site on a hard and dry patch of ground preferably levelled and rolled. piles of sand and piles of different sizes coarse aggregate shall be stored in separate stock piles with height preferably not exceeding 1.25 to 1.5 metres. A bottom layer of aggregates of 10cm deep shall be felt undisturbed while removing the material for use.
- h. If the aggregates are stored at site for a long time there is accumulation of dust. The contractor is required to sieve the aggregate before use, if advised by Corporation's engineers. Washing the aggregates by means of hose pipe is not permitted. Silt and find dust permitted in coarse aggregate is only upto 1% by weight.

## 2.15 WATER :

Water used for both mixing and curing shall be potable and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials or other substance that may be deleterious materials which are likely to affect the strength or durability of concrete or steel. Water containing any sugar shall not be allowed for use. Also water which fails to satisfy the following requirements shall not be used:-



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- a. To neutralize 100ml. sample of water, using mixed indicator, it should not require more than 25ml. of 0.02 normal H<sub>2</sub>SO<sub>4</sub>.
- b. To neutralise of 100 ml. sample of water, using phenolphthalein as an indicator , it should not require more than 5ml. of 0.02 normal NaOH.
- c. Water should not contain solids in excess of the following:
 

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

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

**2.16 MIXES OF CONCRETE :**

Concrete used shall be in volumetric mix / Design mix / RMC such as 1:4:8, 1:3:6, 1:2:4, 1:1.5:3, 1:1:2 / M15, M20, M25 etc.

**2.17 BATCHING :**

The quantity of cement shall be determined by weight. Batching of cement and water shall be as specified in Paras 2.20 and 2.22 respectively.

**2.18a.** In proportioning concrete the quantity of cement shall be determined by weight. One bag of cement containing 50kgs. of cement shall be assumed to contain 35 litres (1;20Cft). The quantities of fine and coarse aggregates and water shall be determined by volume. If fine aggregate is moist allowance shall be made for bulking in accordance with filled method of determining the necessary adjustment for the bulking of fine aggregates. Moisture causes loosely filled sand to occupy a larger volume than it would occupy if dry. It is therefore necessary to increase the volume of sand by the % of baulking. The correction shall be made on the following lines :-

In a 250 cu. cm. measuring cylinder pour the sample of the fine aggregate (Sand) to be used at site, consolidate it by shaking, until it reaches 200 cu. cm. mark. Then fell the cylinder with water and air the sand well. The water must be sufficient to completely submerge the sand. The sand surface will be seen below its original level. Suppose other surface is at mark `X' Cu. cm. The % of baulking of sand due to moisture shall be calculated from the following formula

$$\text{Percentage of baulking `K' = } \frac{200 - X}{X} \times 100$$

$$\text{Therefore true volume = } \frac{100 \times \text{Measured Volume}}{K + 100}$$



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- b. The water cement ratios shall not be more than those specified in Table it below. in case mechanical, vibrators are used, water content shall be suitably reduced, without reducing cement content, to avoid aggregation. Water content specified in table II may be increased under exceptional circumstances where workability of concrete produced poses difficulties of placement and compaction. Prior permission of Corporation's Engineer shall be obtained for this purpose. When the water content is increased in the manner indicated above, the cement content also shall be increased proportionately so that water cement ratio given in Table II is maintained. Cost of extra cement shall be borne by the contractor.

**TABLE II**

Mix of concrete	Quantity of water 50kg Of cement. Max. litre
<b>1:3:5</b>	<b>34</b>
<b>1:2:4</b>	<b>32</b>
<b>1:1½ :3</b>	<b>30</b>
<b>1:1:2</b>	<b>27</b>

- c. Allowance shall be made for surface water present in the aggregate while computing the water content. Surface water shall be determined by one of the field methods described in IS:2386(Part II)/1963. In the absence of exact data, with the approval of the Corporation's Engineer the amount of surface water may be estimated from the values given in table III below:-

**TABLE –III**  
**SURFACE WATER CARRIED BY AVERAGE AGGREGATE.**

Aggregate	Approximate quantity of surface water in litre/Cu.M.
Very wet sand	<b>120</b>
Moderately wet sand	<b>80</b>
Moist sand	<b>40</b>
Moist gravel or crushed rock	<b>20 to40</b>
Coarser the aggregate lesser water it will carry	

## 2.19 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 factor test shall be carried out at intervals as directed by the Corporation's Engineer. The slump test is suitable for slump of 5cm to 15cm.



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**2.20 MIXING AND PLACING OF CONCRETE: MEASUREMENT OF MATERIALS:**

Cement shall be batched by weight even though aggregates are batched by volume. Where the weight of the cement is determined by accepting the maker's weight per bag; a number of bags as directed by Corporation's Engineer shall be weighed separately to check the net weight.

**2.21 AGGREGATES :**

a. The quantities of fine and coarse aggregates shall be determined by volume. The proportions of aggregates (i.e. ratio of fine aggregate to coarse aggregate) shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes, fine, and maximum size of coarse aggregates becomes larger.

i). For an average grading fine aggregate i.e. Zone II of IS: 2386/1963 Part I the ratios of fine aggregate to coarse aggregates shall be:

Maximum size of coarse aggregate	Maximum size of coarse aggregate
10mm	20 mm
1:1 ½	1:2

For fine aggregates within their grading zones the ratio shall be increased as the fine aggregate gets finer, that is, passes from zone I to III.

ii) For maximum size of coarse aggregate 20 mm the ratios of fine aggregate to coarse aggregate shall be (Zones as per IS : 2386/1963 - Part I)

Zone I	Zone II	Zone III
1:1.1/2	1:2	1:3

b. The measuring boxes prepared for measuring the aggregates shall be of correct size. The measuring boxes are required to be certified by Corporation's Engineer before they are used on site. Internal dimensions of the boxes shall be generally 35cm x 25cm x 40cm. Heaping of aggregates over the boxes is prohibited. Aggregates shall be filled in only up to the brim of the boxes and struck off horizontally with a timber or steel bar. Allowance for bulmage for sand shall be made as determined by Corporation's Engineer. Refer clause no- 2.18

**2.22 WATER :**

Water shall be measured by volume in calibrated tanks/vessels having a conical shape narrow at top. Water shall not be measured using ordinary uncelebrated buckets, which are wider at top and narrower at the base. The measurement of water to control and maintain a constant water cement ration is of utmost importance and adequate attention to this requirement by the Contractor to the satisfaction of Corporation's Engineer, shall be given.



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## **2.23 MIXING OF CONCRETE :**

- a. Machine mixing: Concrete shall be mixed in a mechanical mixer, having an optimum speed which yields good concrete that is neither inadequately mixed nor showing tendency of segregation. This avoids frequent washing. A small amount of water shall be fed first followed by all solid materials. Remainder of water shall be added after the solids. Mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. The mixing time shall be counted after all the materials are in drum and shall be in accordance with IS: 1791/1963 but in no case mixing shall be done for less than two minutes.
- b. Hand mixing: Hand mixing shall not be permitted except for unimportant structural members and purely at the discretion of the Corporation's Engineer. Hand mixing will not be permitted for concrete going into columns. When hand mixing is permitted, it shall be ensured that the mixing is continued until the mass is uniform in colour and consistency. the contractor shall use 10% extra cement for hand mixing for which no extra payment will be made. Hand mixing when permitted shall be done on platform.

## **2.24 TRANSPORTING :**

Concrete shall be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of the ingredients. It shall be deposited as nearly as practicable in its final position to avoid re-handling or flowing. Wet concrete discharged from each batch of mixer shall be neatly collected and transported. Remnants from earlier batches shall be rejected and removed.

## **2.25 PLACING :**

The concrete shall be placed in position and compacted before the initial setting time and shall not be disturbed subsequently. Concreting shall be carried out continuously upto construction joints; the position and arrangement of which shall be predetermined.

When the work has to be resumed on the surface which has hardened, it shall be thoroughly hacked, swept clean, wetted and covered with a layer of mortar composed of cement and sand in the same ratio as the cement and sand in the concrete mixture. This mortar shall be freshly mixed and placed immediately before placing of the concrete. Concrete shall be placed in shuttering by shovels or other approved implements and shall not be dropped from a height, say greater than 1 M or handled in a manner which will not cause segregation. Concrete which has already set shall not be allowed to be incorporated in the work even after adding cement and remixing.



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## **2.26 DEBRIS ETC. REMOVED :**

All debris, saw dust, etc. shall be removed from the shuttering before any concrete is placed. Care shall be taken to see that the shuttering is watertight and has been properly treated with approved composition to prevent absorption of water.

Shuttering for concrete shall be rigidly constructed of approved material and shall be true to the shape and dimensions described on the working drawing. Faces in contact with concrete shall be free from adhering grout, projecting nails, splits and other defects. Joints shall be sufficiently tight to prevent the leakage of cement grout and to avoid the formation of fins and other blemishes. Shuttering shall be secured so as to be strong enough to retain the correct shape during consolidation of concrete. Shuttering shall be true to line and braced and strutted to prevent deformation under the weight and pressure of the wet concrete, constructional loads, wind and other forces. The shuttering of beams and slabs shall be erected in such a way that the shuttering on the sides of the beams and soffits of slabs can be removed without disturbing the beam bottoms. Re-propping of beams shall not be permitted. Immediately prior to placing of the concrete, the shuttering shall be well wetted.

## **2.27 PROTECTION AND PLACING IN LAYERS :**

Concrete shall be placed in single operation to the full thickness of slabs, beams and similar members and shall be placed in horizontal layers not exceeding 1M deep in walls, columns and similar members. Concrete after placing shall be protected by use of covering to the approval of the Corporation's Engineer during first stages of hardening against high winds, hot sun and/or rain or surface water. No shock or vibrations shall be allowed to be imparted to forms supporting fresh concrete.

## **2.28 COMPACTION :**

Concrete shall be thoroughly compacted during operation of placing and carefully worked around the reinforcement embedded fixtures and into corners of form work. The use of mechanical vibrators is strongly recommended. Sufficient number of vibrators (including stand by) of adequate capacities shall be used for compaction of concrete. Vibration shall be carried out by trained men and in the presence of a qualified supervisor trained in the use of vibrators and vibrated concrete. In certain portions where vibration is not effective, careful rodding and tamping shall be carried out and sufficient men employed to ensure that thorough consolidation takes place. Where manual compaction becomes necessary the workability of the mix should be controlled to suit such mode of compaction subject, of course, to compliance of strength requirements specified.



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## **2.29 CONTINUOUS CONCRETING :**

Concreting shall be carried out continuously up to predetermined positions of construction joints. The position and arrangement for construction joints shall be approved by the Corporation's Engineer. Rest pauses for meals etc. shall be subject to the Corporation's Engineer's approval.

## **2.30 PACKING ROUND REINFORCEMENT :**

In the case of reinforced concrete work, the concrete shall be carefully consolidated round the reinforcement and care shall be taken to ensure that reinforcement is not displaced during the placing and compaction of concrete. If reinforcement moves out of its place, it must be brought back to position immediately.

## **2.31 VIBRATION OF CONCRETE :**

- a. Number and size of vibrations: Vibrators shall be of sturdy construction, adequately powered and capable of transmitting to the concrete not less than 3500 impulses per minute when operating under load. The vibration shall be sufficiently tense to cause the concrete to flow or settle readily into place and visibly effect the concrete over a radius of at least 450 mm(18") when used in concrete having slump of 25mm. A sufficient number of vibrators (at least one vibrator for a rate of concreting of 1.5 Cum.i.e 50 Cu. ft per hour) shall be employed so that vibration throughout the entire volume of each layer of concrete and complete compaction are secured.
- b. Manipulation of vibrators: Internal vibrators shall be keep constantly moving in the concrete and shall be applied at points uniformly placed not farther apart than the radius over which the vibrator is visibly effective. The vibrator shall not be held in one location long enough to draw out a pool of grout from surrounding concrete. The vibration shall be such that the concrete becomes uniformly plastic and there shall be at least 200 seconds of vibration per square metre (20 seconds of vibration per sq. ft.) of surface of each layer of concrete, computed on the basis of visibly effected radius and taking overlap into consideration, vibrations shall be stopped when air bubbles have practically cease coming to the surface.

## **2.32 CURING :**

All concrete work shall be kept constantly wet for a minimum period of seven days after concreting Horizontal surfaces shall be kept covered with water ponded by means of bunds and vertical surfaces like those of columns, fins, etc. by burlaps kept constantly wet by water sprays. Mere sprinkling of water on vertical surfaces without sacks of burlaps will not be allowed. In respect of concrete made out of Pozzolana cement curing shall be continued for another eight days, viz. fifteen days in all.

## **2.33 TRADING SUPERVISOR :**

CONTRACTOR

CHIEF ENGINEER



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It is essential that the contractor's supervisor who is in charge of the construction an all concrete works, whether reinforced or not, shall be skilled in this class of work and shall superintend personally the whole construction and pay special attention to:-

- a. The quality, testing, proportioning and mixing of the materials and particularly control of water cement ratio.
- b. Laying of materials in place and thorough consolidation of the concrete to ensure solidity and freedom from voids.
- c. Sizes and positions of reinforcements.

### 2.34 STRENGTH REQUIREMENTS OF CONCRETE :

Where ordinary Portland cement is used, the compressive strength requirements for various mixes of concrete shall be as given in Table IV. It shall be the contractor's responsibility to obtain specified strengths for the various mixes of concrete .

**TABLE IV**

**STRENGTH REQUIREMENTS OF CONCRETE**

(All values in kg/ sq. cm.)

All tests conducted in accordance with IS 516-1959.

Concrete Mix.	Minimum Compressive strength on 15cm cubes at 7 days (works Test only)	Minimum compressive strength of 15 cm cubes at 28 days. (works test only)
<b>1:3:6</b>	<b>70</b>	<b>100</b>
<b>1:2:4</b>	<b>100</b>	<b>150</b>
<b>1:1 ½ :3</b>	<b>135</b>	<b>200</b>
<b>1:1:2</b>	<b>170</b>	<b>250</b>

**Note :** Works Test: A test conducted in an approved laboratory on the specimens made on the works, out of the concrete being used on the works.

### 2.35 CRITERION REGARDING STRENGTH :

Although the works test Cubes are specified to be conducted at the age of 7 and 28 days, in all cases 28 days compressive strength specified in Table IV shall alone be the criterion for acceptance or rejection of concrete.

### 2.36 CLASSIFICATION OF CONCRETE OF LOWER OR HIGHER STRENGTH THAN SPECIFIED :



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If concrete made in accordance with the proportions given for a particular mix does not yield the specified average strength of three cubes at 28 days( refer table V for acceptance criteria) such concrete shall be dealt as stated in the criteria for acceptance of concrete.

### **2.37 TEST CUBES :**

- a. Concrete used for preparing works test cubes shall represent quality of concrete incorporated in the work. The concrete for preparation of one set of six cubes shall be taken from one batch of mixed concrete discharged from mixer. The cubes shall be moulded in accordance with Indian standard code of practices.
- b. The cubes shall be cured as per IS Code of practices: The entire operation of casting, arranging and dispatch of cubes to laboratory will be carried out by the Contractor under the joint supervision of the Corporation's Engineer and Contractor's Engineer. Out of six cubes, three cubes shall be tested at an age of seven days and the other three at the age for 28 days in a laboratory approved by the Chief Engineer.
- c. The cubes shall be initialed jointly by Contractor's representative and the Corporation's Engineer with a piece of wire on nail, so that an indentation of the initials is left on the cubes.
- d. The contractor shall arrange to transport the cubes to the laboratory and arrange to have the test results forwarded (in duplicate) directly from the laboratory to the Corporation's Engineer. The contractor shall bear all expenses in connection with the preparation of test cubes like cost of moulds, cost of concrete, labour and transportation charges to the approved laboratory etc. The charges for testing shall be paid initially by the Contractor to the laboratory.
- e. A register shall be maintained at site by the Corporation's Engineer with the following details entered and initialed by the contractor and the Corporation's Engineer:-
  - i. Date and time of casting.
  - ii. The mix of concrete.
  - iii. Reference to specific structural member receiving the batch of concrete from which the cubes were cast.
  - iv. Mark on cubes.
  - v. Water cement ratio by weight and slump.
  - vi. Crushing strengths as obtained at the end of seven days for three cubes out of a set of six and at the end of 28 days for the other three cubes.
  - vii. Laboratory in which tested and reference to test certificate.
  - viii. Any other information directed by the Chief Engineer.



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- f. A record of the quantity of concrete incorporated in the work that is represented by the quality of concrete of the set of cubes along with the description of the structural members where such concrete has been deposited shall be maintained. For floor beams and slabs, such record shall be supported by a drawing on which the areas of concreting carried out and representing the set of cubes take out shall be properly demarcated with cube references entered in the drawing at the relevant portions. This record shall be initialed by the contractor and maintained by the Corporation's Engineer.
- g. Samples size and acceptance criteria: All tests shall be carried out in accordance with IS:516-1959. The number of test specimens required, the frequency of sampling and the criteria for acceptance of a concrete of a specified mix shall be in accordance with the Table V: 'Ordinary Concrete'.

### 2.38 **STANDARD OF ACCEPTANCE :**

Seven days tests: The average compressive strength of the three specimens tested at seven days shall satisfy the specified strengths given in Table IV, for the appropriate mix. As a guidance the difference between the maximum and the minimum strength of the three specimens shall not exceed 15% of the average strength. In case seven days test result is not satisfactory all further work structurally interlinked with the concrete represented by the samples shall be stopped unless otherwise decided by Chief Engineer.

Twenty eight days test: Acceptance criteria of twenty eight days shall be as follows :

- a. If the average compressive strength of three cubes is more than the compressive strength indicated in Table IV, the concrete shall be accepted at full rates.
- b. If the average compressive strength of three cubes is less than the specified but not less than 85% of the specified strength, the concrete may be accepted at reduced rate at the discretion of the Chief Engineer.
- c. If the average compressive strength of three cubes is less than 85% of the specified strength, Chief Engineer shall reject and get dismantled the defective portion of the work represented by the sample along with the structurally connected work as considered necessary at the risk and cost of the Contractor.

In case of (b) and (c) above, Chief Engineer, if he so decides may order the additional tests like core test, ultrasonic test, rebound hammer test, load test of structure or part of structure etc. to be carried out. All the charges in connection with these additional tests shall be borne by the contractor. If on the basis of these additional tests the Chief Engineer is satisfied about the structural adequacy of the concrete, he may accept the work at reduced rates.



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**2.39 CONCRETE ORDERED TO BE DISMANTLED :**

Where the Chief Engineer does not accept the poor or defective concrete and orders the same to be dismantled then the contractor shall dismantle such concrete at his expense and reconstruct the same to the Chief Engineer's satisfaction. Concrete thus dismantled will not be measured and paid for. The additional work if any, required to be carried out for reconcreting, shall be to the contractor's account.

**2.40 CONCRETE RETAINED WITH RECTIFICATION :**

Where the Chief Engineer in order to save time and where he considers adequate, orders that defective concrete be strengthened as directed by him the contractor shall carry out all rectification measures to Chief Engineer's approval at his expense. The concrete thus strengthened and accepted shall however, be paid at reduced rate (for mixes of concrete refer table IV under para 2.34).

**2.41 QUANTITY OF DEFECTIVE CONCRETE REPRESENTED BY CUBES:**

In all cases of defective concrete as revealed by works test cubes strength failing below the specified strength, the quantity of concrete thus affected and represented by the cubes shall be decided by the Chief Engineer whose decision shall be final and binding on the contractor.

**In all cases of Design Mix Concrete the sampling, strength of designed concrete mix, acceptance criteria, inspection and testing of structures, clause no – 15, clause no – 16 and clause – 17 (along with all sub clauses under clause no – 15, clause – 16, clause – 17) of IS 456 : 2000 shall be applicable.**



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**TABLE V :- ACCEPTANCE CRITERIA, TESTS ETC. FOR CONCRETE**  
 (Ref. : Para 2.37 and 2.38)

AGGREGATE							CONCRETE					
Separation		Grading	Tests	Batching		Workability	Test					
Fine	Coarse		Moisture determination	Cement	Aggregates		Minimum number of Specimens (15 em cubes)		Strength (Works Test Only) Minimum Frequency			Criteria for Acceptance
							7 days Compressive Strength Test	28 days Compressive Strength Test	Quantity In M <sup>3</sup>	No. of samples	In Terms of Period	
One Size	Single Sized aggregate in two sizes (20mm 10 mm) for maximum 20mm size aggregates or In three sizes (40mm, 20mm, 10mm) for max-40mm sized aggregates or if approved by EE graded aggregates conforming to Table under Para 2.14 (d)	After Standard Has been established when variation is suspected	When Variation in moisture is suspected e.g. rain	By Weight	By Volume	As frequency as directed by the corporation's Engineers.	3	3	1-5 6-15 16-30 31-50 51 & above	1 2 3 4 4+1 additional sample for each 50 M <sup>3</sup> or part thereof.	As decided by E.E.	Refer Para 2.38



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## 2.42 HONEY COMBING :

- a. Where honeycombed surfaces are noticed in the concrete, the contractor shall not patch up the same until examined by the Corporation's Engineer and decision given regarding the acceptance with rectification or rejection of the same. If contractor patches up such defects without the knowledge of the Corporation's Engineer, the corporation's Engineer will be at liberty to order demolition of the concerned concrete members to the extent he considers necessary. In such case, the contractor at his expense shall reconstruct demolished work. Demolished work shall not be measured and paid for.
- b. If in the opinion of the Corporation's Engineer the honeycombing is harmful to the structure and where so directed by the Chief Engineer, the full structural members affected by honeycombing as decided by Chief Engineer shall be dismantled and reconstructed to Chief Engineer's approval at contractor's expense. The demolished concrete will not be measured and paid for.

Such honeycombed areas which are not severe in the opinion of Corporation's Engineering and can be retained rectification shall be dealt with as under:-

Patches are first treated with the coat of thin grout composed of 1 part of cement and 1 part of sand and then filled with mortar similar to that used in the concrete. The mortar is placed in layers not more than 10 mm thick and each layer is given a scratch finish to secure bond with the succeeding layer.

- c. Such honeycombed areas which are not severe in the opinion of Corporation's Engineer and can be retained with rectification shall be dealt with as under :-

Patches are first treated with the coat of thin grout composed of 1 part of cement and 1 part of sand and then filled with mortar similar to that used in the concrete. The mortar is placed in layers not more than 10mm thick and each layer is given a scratch finish to secure bond with the succeeding layer.

## 2.43 OTHER DEFECTS :

Any other defects in concrete shall be made good as directed by the Chief Engineer at contractor's expense.



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#### **2.44 DEVALUATION OF RATES FOR CONCRETE NOT CONFORMING TO SPECIFIED STRENGTH :**

In case of average compressive strength being less than the specified strength but up to 85% of the specified strength, the rate payable shall be in the same proportion as average compressive strength bears to the specified compressive strength.

In case average compressive strength of concrete is less than 85% of the specified strength (but the same is accepted to be retained in the structure), the rate payable shall be 85% of the quoted rate minus 1½ times the further percentage reduction below 85% strength.

**Note:** While working out the devaluation only the concrete component of the rate excluding shuttering shall be taken into account for calculation.

#### **2.45 CONSTRUCTION JOINTS :**

##### **α. Location:**

The contractor shall submit sketches showing the locations where he proposes to provide construction joints and get them approved from the Corporation's Engineer prior to concreting.

##### **β. Stop boards:**

All vertical construction joints shall be formed with proper wooden stop board at the joint. Where directed the joint shall be rebated or joggled and be of approved shape.

##### **χ. Water bars:**

Wherever water bars/stops are specified, the same shall be provided as per drawings or as directed. It is necessary to ensure that water bars form continuous diaphragms. When PVC water bars/stops are provided the joints shall be properly heated and fused as per manufacturers' specifications.

#### **2.46 CONSTRUCTION JOINTS IN BASEMENT :**

##### **a. Location and formation:**

Contractor shall prepare a drawing showing the proposed constructions joints and have it approved by the Corporation's Engineer. After it is necessary to place stop boards, well in advance, at predetermined positions and carry out the concreting right up to the stop boards.

**b.** Particular care is required to form and treat construction joints in basement in order to ensure water-tightness for which contractor shall be responsible.

**c.** Joints in the base slab: Joints in the base slabs and beams of a basement shall be so located that the joint is parallel to the principal reinforcement. Where it is unavoidable and is at right angle to the principal reinforcement, the joint shall be in the middle of the span of the slab or beams.



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- d. Formation vertical joints: Vertical construction joints in base slab and well of basement shall be formed by using vertical stop-boards in predetermined positions. P.V.C. water bars shall be provided for vertical joints in walls.
- e. Formation horizontal joints: Horizontal joints in walls shall be rebated and care shall be taken to establish a proper and good bond between the hardened concrete and freshly laid concrete to produce a watertight joint which shall be contractor's responsibility. P.V.C. water bars shall be provided for horizontal joints in walls.

Wall slab junctions: Each layer must be compacted before placing the next layer, concrete in the splays at the junction of the wall and the slab shall be placed without joint at the time of concreting the slab.

#### **2.47 TREATMENT OF CONSTRUCTION JOINTS IN BASEMENTS :**

- a. When work is resumed on the surface which has hardened such surface shall be roughened. It shall be thoroughly cleaned and wetted and covered with 12mm layer or mortar composed of cement and sand in the same ratio as cement and sand in the concrete mix. This 12mm layer of mortar shall be freshly mixed and placed immediately before the placing of the concrete.
- b. Where the surface has not fully hardened, the laitance shall be removed by scrubbing the wet surface with wire bristle brushes, care being taken to avoid dislodgement of aggregate particles. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with thin neat cement grout.
- c. Care shall be taken to obtain good bond between the hardened and freshly placed concrete. Careful ramming and moulding of concrete around the water bar is very important.

#### **2.48 CONSTRUCTION JOINTS IN SUPERSTRUCTURE :**

a. **COLUMNS :**

A joint shall be formed horizontally at the top of a foundation and 75mm below the lowest soffit of the beams meeting at the head of the column or 12mm below the top of anchor bar projected from the floor beam into the column which ever is lower. Concrete in the head of a column where one or more beams meet shall be placed without a joint i.e. concrete in the joint shall be poured along with floor concrete.



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b. **BEAMS** :

Concrete in the beam shall be placed throughout without a joint but if the provision of a joint is unavoidable, the joint shall be vertical and at the middle of the span.

c. **SLAB** :

A joint in the slab shall be vertical and parallel to the principal reinforcement. Where it is unavoidable and at right angles to the principal reinforcement, the joint shall be vertical and at the middle of the span.

d. Treatment of construction joints:

same as for construction joints in basement i.e. 2.47 above.

**2.49 EXPANSION JOINTS :**

a. Expansion joints shall be provided as shown in the drawings.

b. Expansion joints are meant to provide discontinuity in the structure. Care shall be taken to ensure this discontinuity by having clear joints throughout the length and height of the expansion joints. There shall be no connection between two sides of an expansion joint except with the materials used to form the expansion joints like fillers, G.I. strips etc.

c. Filler material for expansion joints shall be Shalitek joint filler as manufactured by M/s Shalimar or other equal and approved make and of appropriate thickness. The filler material shall extend to the entire depth of a joint except for a distance of 25mm from the exposed faces.

d. Contractor shall ensure that expansion joints are made watertight and the no leakages occur through these joints for which he shall be responsible.

**2.50 WATER TIGHT CONCRETE :**

Concrete in all basement works such as basement base slab and beams, walls, etc. Water tanks and the like where concrete of 1: 1½ :3 mix or richer mix is specified, will be considered as watertight concrete whether so specifically mentioned or not in the Schedule of Quantities. In respect of such concrete it shall be the contractor's responsibility to ensure that the resulting construction is watertight. If it is not, the contractor shall carry out at his own cost, all necessary remedial measures which the Chief Engineer directs.

**2.51 FORM WORK : MATERIALS AND DESIGN :**

a. The form work shall be to timber or plywood or steel. if any particular material or materials be specified in the Schedule of quantities for form work such particularly specified material or materials shall be used in work. The form work shall be so constructed as to remain



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sufficiently rigid during placing of the concrete and shall be sufficiently tight to prevent, loss of liquid from the concrete. The forms shall have sufficient strength and rigidity to hold concrete and withstand the pressure of ramming and vibration without excessive deflection of the prescribed lines and more so when the concrete is vibrated. The surface of all forms in contact with concrete shall be clean, rigid, watertight and smooth. Suitable devices shall be used to hold corners, adjacent ends and edges of panels of other forms together in accurate alignment.

- b. The form work shall conform to the shape, lines and dimensions to suit the RCC members as shown on drawings and to be so constructed. Form work shall be adequately designed to support the full weight of workers, fresh placed concrete without yielding settlement or deflection and to ensure good and truly aligned concrete finished in accordance with the construction drawings. A camber in all directions of 6mm for every 5M span in all slab and beam centering shall be given to allow for a unavoidable sagging due to compression or other causes.
- c. The form work shall be so designed that the sides of the beams shall be first struck leaving the soffit of beams and the supporting props in position. Props shall be designed to allow accurate adjustment and to permit of their being struck without jarring the concrete.
- d. Temporary opening shall be provided at the base of column form and at other points where necessary to facilitate cleaning and observation immediately before concrete is deposited.
- e. Vertical shuttering: The vertical shuttering shall be carried down to such solid surface as is sufficiently strong to afford adequate support and shall remain in position until the newly constructed work is able to support itself. Props shall be securely braced against lateral deflection. Where timber props are used like bullies, they shall be of a minimum diameter of 10cm. and shall be straight and adequately strong. The spacing of such struts shall be designed to carry loads imposed on it without undue deflection of the members supported by the props. The spacing of props shall be approved by the corporation's Engineer and any alterations suggested by him shall be carried out at contractor's expense. Bracing shall be provided as directed without extra cost. Contractor shall allow in his rates providing props and struts for any height shown in the working drawings issued to Contractor from time to time.



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## 2.52 WATER TIGHTNESS :

It is the contractor's responsibility to ensure that the forms are checked for water tightness just before concreting operation starts and to make good any deficiencies.

## 2.53 CLEANING AND TREATMENT OF FORMS :

All rubbish, particularly chippings, shavings and sawdust, shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

## 2.54 STRIPPING :

Forms shall be left in place until their removal is authorised by the Corporation's Engineer and shall then be removed with care so as to avoid injury to concrete. In no circumstances shall forms be struck until the concrete reaches a strength of at least twice the stress to which concrete may be subjected at the time of striking. The strength referred to shall be that of concrete using the same cement and aggregates with the same proportions, and cured under conditions of temperature and moisture similar to those existing on the work. Where possible, the form work shall be left longer, as it would assist the curing.

## 2.55 STRIPPING TIME :

Removal of form work (stripping time): In normal circumstance and where various types of cements are used, forms, may generally be removed after the expiry of the following periods:

**TABLE - VI**

Type of form work	Minimum period before striking form work for OPC 33 grade	Minimum period before striking form work for OPC 43 grade	Minimum period before striking form work for PPC
(a) Vertical form work to column, walls, beams	16 – 24 hrs.	16 – 24 hrs.	24 – 36 hrs.
(b) Soffit form work to slabs (Props to be refixed immediately after removal of form work)	3 days	3 days	4 days
(c) Soffit form work to beams (Props to be refixed immediately after removal of form work)	7 days	7 days	10 days
(d) Props to slabs:			
(i) Spanning upto 4.5m	7 days	7 days	10 days
(ii) Spanning over 4.5m	14 days	14 days	20 days



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(e) Props to beams:			
(i) Spanning upto 6.0m	14 days	14 days	20 days
(ii) Spanning over 6.0m	21 days	21 days	30 days

**Note 1:** For other type of cement, the stripping time recommended for ordinary Portland cement may be suitably modified. Generally if Portland Pozzolana or low heat cement or OPC with direct addition of fly ash has been used for concrete, the stripping time will be 10/7 of the period stated for OPC with 43 grade cement above.

**Note 2:** The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slabs, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

**Note 3:** For rapid hardening cement, 3/7 of above period for OPC 33 grade will be sufficient in all cases except for vertical side of slabs, beams and columns which should be retained for at least 24 hours.

**Note 4:** In case of cantilever slabs, beams, the centering shall remain till structures for counter acting or bearing down have been erected and have attained sufficient strength.

**Note 5:** Proper precautions should be taken to allow for the decrease in the rate of hardening that occurs with all types of cement in cold weather and accordingly stripping time shall be increased.

**Note 6:** Work damaged through premature or careless removal of forms shall be reconstructed within 24 hours.

**2.56 FORM WORK IN LIFTS FOR CONTINUOUS SURFACES :**

Where forms for continuous surface are placed in successive units (as for example in columns or walls), the forms shall fit tightly over the completed surfaces so as to prevent leakage of mortar from the concrete and do maintain accurate alignment of the surface.

**2.57 PROCEDURE FOR REMOVING THE FORM WORK :**

All form work shall be removed without such shock or vibration as would damage the reinforced concrete. Before the soffit and struts are removed, the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cements in the cold weather. For cantilevers props shall be removed from the tip towards support. Special notes given in relevant structural drawings shall be strictly adhered to in order to avoid mishaps.



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## **2.58 TOLERANCES:**

The following shall be the maximum permissible tolerances:-

- a. On general setting out dimensions upto 4M in length, a tolerance upto 3mm will be allowed.
- b. On lengths of more than 4M tolerance of not more than 5mm will be allowed.
- c. On the cross sectional dimensions of columns, beams, slabs, facia, chhajjas, mullions, grilles, fins, louvers and such other members tolerance of more than 2mm will not be allowed
- d. The top surface of concrete floor slab shall be within 6mm of the level and line shown on the drawings.
- e. Column and walls and other vertical members shall not be more than 3mm out of plumb in their storey height and not more than 6mm out of plumb in their full height.
- f. If the work is not carried out within the tolerances set out above in (a) to (e) , the cost of all rectification measures or dismantling and reconstructing as decided by the Chief Engineer shall be borne by the contractor. In case work is dismantled, the same shall not be measured and paid for.

## **2.59 CONTRACTOR'S RATES FOR CONCRETE TO INCLUDE :**

The rates of contractor for providing and laying cement concrete in various grades or proportions in the Schedule of quantities shall, apart from any other factors specified elsewhere in the tender documents, include for the following:

- a. For all factors and method of work described in these specifications:
- b. For all materials, labour tools and plants, scaffolding, etc. mixing conveying and placing concrete in position, ramming, vibrating, toweling, curing providing necessary scaffolding and removing the same after the work is complete.
- c. Unless otherwise specified in the Schedule of Quantities the cost of concrete items, shall include for providing and fixing from work as described inclusive of erecting, propping to required heights, bracing, providing slays, struts, bolts nuts and everything necessary to keep the forms rigid, smoothening the surface to receive concrete as per detailed drawings, striking and stripping form work after the concrete is cure, hacking the concrete surface required to receive plaster etc.
- d. The reinforcement in case of reinforced concrete work will be paid for separately unless otherwise stated in the particular items, but rate shall include for pouring concrete and packing around reinforcement.



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- e. The measurement of concrete will be as per detailed drawings, shapes and size based on net structural sizes as per drawings i.e. exclusive of plaster;
- f. Rates for concrete items shall cover for any shape of structural members like columns, beams fascias, fins, louvers, etc. and of cantilevered beams, slabs etc. as per detailed final drawings including providing slopes to slabs, beams, chajjas, canopies etc. wherever required.
- g. Formation and treatment of construction and expansion joints (where water bars like P.V.C. water bars, strips or joints fillers like "Shalitex" or other equal and approved make are specified, such materials shall be paid for separately);
- h. Fixing all inserts like pipes, plugs, forming holes, etc. as described.
- i) For volumetric batching
- j. For taking out dowel bars, fan hooks etc. through shuttering;
- k. In cases where at the junctions of beams, columns, slabs the composition of concrete mix or specified strength be different for columns, beams and slabs, then in such cases only the richer concrete among those specified for in all these members shall be used at the junctions and rate quoted for columns, beams and slabs or any members entering such junctions shall allow for the same. Rate shall also cover for spill over of richer concrete in beams to natural angle of repose of wet concrete required from practical considerations, while concreting the junctions
- l. For forming chambers, bands and drip moulds in columns, beams, slabs, chajjas, fascias, sills, coping etc. and where shown in the drawings or as directed;
- m) For work at all levels.

#### **2.61 STEEL REINFORCEMENT AND IRON WORK :**

High strength TMT steel bars and wires for concrete reinforcement shall be as per IS 1786:2008 including amendment, if any (Fe-500. Primary TMT bar is to be use i.e. SAIL, TATA & RINL) .

#### **2.61 CLEANING OF REINFORCEMENT :**

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, dust, grease and other objectionable substances.

#### **2.62 CUTTING OF REINFORCEMENT:**

Before the reinforcement bars are cut the contractor shall study the lengths of bars required as per drawing and shall carry out cutting only to suit the sizes required as per drawings.



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### 2.63 **PLACING AND SECURING:**

Reinforcement bars shall be accurately placed and secure in position and firmly supported or wedged by precast concrete blocks of suitable thickness, at sufficiently close intervals so that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. It is most important to maintain reinforcement in its correct position without displacement and to maintain the correct specified cover. Contractor shall be responsible for all costs for rectification required in case the bars are displaced out of their correct position.

### 2.64 **BINDING WIRE :**

The reinforcement shall be securely bound wherever bars cross or required with annealed steel binding wire of size not less than 0.9 mm and Conforming to IS 280-1962.

### 2.65 **WELDING :**

Welding of bars shall not be carried out unless specially authorised in writing by the Chief Engineer.

### 2.66 **BENDS ETC :**

Bends, cranks etc. on steel reinforcement shall be carefully formed, care being taken to keep bends out of winding. Otherwise all rods shall be truly straight. If any bend shows signs of brittleness or cracking, the rod shall be removed immediately from the site. Minimum radius of 9 times diameter of the bar shall be used unless otherwise specified in the drawings. However, in respect of standard hooks the radius of bend shall be 2 times of diameter of bar. Heating of reinforcement of bar to facilitate bending will not be permitted. The bars shall always be bent by heating with written permission of the Executive Engineer. Bars when bent hot shall not be heated beyond cherry red colour and after bending shall be allowed to cool slowly without quenching. The bars damaged or weakened in any way in bending shall not be used on the work. High strength deformed bars shall in no case be heated to facilitate bending or cranking.

### 2.67 **INSPECTION OF REINFORCEMENT :**

No concreting shall be commenced until the Corporation's Engineer has inspected the reinforcement in position and until his approval has been obtained. A notice of at least 24 hours shall be given to the Corporation's Engineer by the Contractor for inspection of reinforcement. If in the opinion of the Corporation's Engineer any material is not in accordance with the specification or the reinforcement is incorrectly spaced, bent or otherwise defective, the Contractor shall immediately remove such materials from the site and replace with new and rectify any other defects in accordance with the instruction of the Corporation's Engineer and to his entire satisfaction.



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## **2.68 NETT MEASUREMENTS :**

Reinforcement shall be placed as shown on the structural drawings and payment will be made on the net measurement from drawings. Only such laps, dowels, chairs and pins on reinforcement as approved by the Executive Engineer of shown on drawings shall be paid for. The Contractor shall allow in his quoted rate for all wastage which will not be paid for

## **2.69 COVER FOR REINFORCEMENT :**

Cover shall be measured from the outer surface of main reinforcement. Cover shall be as follows:

- a. At each end of a reinforcement bar, 25mm or twice the diameter of such rod or bar, whichever is greater.
- b. For a longitudinal reinforcing bar in a beam, 25mm or the diameter of such rod or bar, whichever is greater.
- c. For tensile, compressive, shear or other reinforcement in a slab, 15 mm, or the diameter of such reinforcement, whichever is greater.
- d. For reinforcement in any other member such as a lintel, chhajja, Canopy or pardi, 13mm, or the diameters of such reinforcement, whichever is greater.
- e. For main reinforcement in isolated footings (side and bottom) clear cover be 50mm.
- f. For column bars clear cover shall be 40mm, unless otherwise specified in drawing.
- g. For bars in slabs of strip footings and mat foundations, the clear cover shall be 30mm. Beam bars shall be placed over slab bars in respect of beam and slab type foundations.

## **2.70 STOCK AND PILLING OF STEEL : (DELETED)**

Steel required shall be stockpiled well in advance of need in the work. Contractors shall stockpile 1/3 requirement within 15 days of commencement, 2/3 requirement at 1/4 contract time and full requirement at 1/2 contract time.

## **2.71 RATES QUOTED FOR REINFORCEMENT SHALL IN ADDITION TO ANY FACTORS MENTIONED ELSEWHERE SHALL ALSO INCLUDE FOR :**

- a. All cutting to lengths, labour in bending and cranking, forming hooked ends, handling, hoisting and everything necessary to fix reinforcement in work as per drawing.



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- b. Cost of binding wire required as described. The weight of binding, wire will not be accounted for in the measurements.
- c. Cost of precast concrete cover blocks to maintain cover and holding reinforcement in position.
- d. For fabricating and fixing reinforcement in any structural member irrespective of its location, dimensions and level.
- e. Removal of rust and every other undesirable substances, using wire brush etc. as described.
- f. Stock piling of reinforcement as described.
- g. Work at all levels.

**2.72 RATE FOR M.S. RAILING, GRILLS, ROLLING SHUTTER, GRILL DOOR, LADDER, RUNG LADDER, WELDMESH GRILLS, FAN HOOKS ETC., SHALL INCLUDE FOR THE FOLLOWING:-**

- a. Fabrication, cutting and bending to required size and shape, drilling, punching, counter sinking, welding, fitting, etc. finishing erecting, fixing in position.
- b. Wherever the M.S. grills/railing/rolling shutter/M.S. Weld mesh grille are required to be fixed to brick/concrete jambs/floor, they shall be fixed by means of required size and number of M.S. lugs and embedded/grouted in cement concrete block 1:2:4 and/or fixed by means of suitable counter sunk screws with rawl plugs.
- c. Wherever the M.S. grills are required to be fixed to frames of steel windows and ventilators, they shall be fixed by welding.
- d. Grille door shall be fixed by means of M.S. holdfasts of required numbers, size and shape as approved, embedding/grouting the holdfasts in 1:2:4 cement concrete block and/or rag bolts and nuts of approved size.
- e. Both legs of both ends of M.S. ladders shall be fixed to concrete floor/slab by embedding/grouting in 1:2:4 cement concrete block/base of required size.
- f. M.S. rung ladders shall be fixed in brick/concrete work by embedding/grouting as required in 1:2:4 cement concrete.
- g. In case of M.S. grill doors the contractor shall provide and fix G.I. pipe pieces of suitable size wherever required, duly inserted in brick/concrete jambs to accommodate the sliding rod of aldrop.
- h. The fixing accessories like M.S. holdfasts, lugs, screws, rawl plugs, concrete for embedding/grouting, bolts and nuts of any type, G.I. pipe pieces and such other accessories for fixing, shall not be considered in the measurement of the weight/quantity and shall not be paid separately.



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- i. Rates quoted for M.S. guard bars/M.S. grills to windows and ventilators shall also include for making holes in frames of windows and ventilators/fan lights wherever required.
- 2.73** Except for bar reinforcement, all exposed steel, cast iron, wrought iron and mild steel work shall be painted with two coats of synthetic enamel paint (first quality) of approved colour and shade over a coat of red oxide primer, manufactured by M/s Alkali and Chemical corporation of India, M/s Garware paints, M/s Goodlass Nerolac, M/s Jenson & Nicholson, M/s British paints or other equal and approved. Rate quoted shall include for above. Although, three coats of paint are specified, Contractor will have to do additional coats of paint if well finished surface is not obtained to the satisfaction of the S.E./E.E. and there shall be no extra payment on account of this.
- 2.74** M/s rounds for M.S. guard bars to windows/ventilators and M.S. rounds for rung ladders shall be supplied by contractor.

**2.75** **MEASUREMENT :**

Weight of the steel reinforcement bars (mild Steel and high strength deformed bars) used in the construction shall be on the basis of the length incorporated in concrete and shall be computed in accordance with the table given below:

Diameter	mm.	Weight per Metre length in kgs.
<b>6</b>		0.222
<b>8</b>		0.395
<b>10</b>		0.617
<b>12</b>		0.888
<b>16</b>		1.579
<b>20</b>		2.467
<b>22</b>		2.985
<b>25</b>		3.855
<b>28</b>		4.836
<b>32</b>		6.316

(The weight per metre of bars given in the table above is calculated on the basis that steel weights 7.85 g/cm<sup>3</sup>. In case of any error or omission in this table, the weight per metre length in kgs shall be computed on the basis of actual area and taking the density of steel as 7.85 g/cm<sup>3</sup>).

- 2.76** For measurement of rolling shutter the area of the actual opening covered shall be considered.



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### 3. BRICK WORK

#### 3.1 BRICKS :

- a. The bricks shall be table moulded first quality of regular and uniform size, shape and colour, uniformly well burnt through out but not over burnt. They shall have plane rectangular faces with parallel sides and sharp, straight and right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10 mm depth on one of their first faces.
- b. They shall give a clear metallic ringing sound when struck.
- c. They shall show a fine grained, uniform, homogeneous and dense texture on fracture and be free from lumps of lime, lamination, cracks, airholes, soluble salts causing efflorescence of other defects which may in any way impair their strength, durability, appearance or usefulness for the purpose intended. They shall not have any part under burnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60 cm.
- d. Bricks of one standard size shall be used on one work unless specially permitted by the Executive Engineer. In part of Eastern Zone (i.e., West Bengal, Assam, Odisha and Bihar etc.) bricks which are commonly of size 25 x 12.5 x 7.5 cm. shall be used. The following tolerances are permitted in the standard conventional size adopted on a particular work :-

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Length	Plus or minus	3mm (about 1/8")
Breadth	Plus or minus	1.5mm (About 1/16")
Depth	Plus of minus	1.5mm (About 1/16")

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- e. After immersion in water, absorption by weight shall not exceed 20 percent of the dry weight of the brick when tested according to I.S.S. No. 1077-1976.
- f. Unless otherwise specified, the load to crush the brick when tested according to I.S.S. No. 1077-1976 shall not be less than 50 Kg / Sq.cm.

#### 3.2 MORTAR :

Unless otherwise specified, mortar for brick work shall be composed of 1 part of cement to 5 parts of coarse approved sand for walls of one brick thick (i.e., 23 cms.) and over and one part of cement



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to 4 parts of coarse approved sand for half thick wall. Other specifications for mortar in brick work shall be as per I.S.S. 2116-1965.

The particle size grading of sand in mortar for unreinforced masonry work shall be within the limits specified below :-

I.S. Sieve designation	Percentage by weight Passing I.S. Sieve.
4.75 mm	100
2.36 mm	90-100
1.18 mm	70-100
600 micron	40-100
300 micron	5-70
150 micron	0-15

### **3.3 CONSTRUCTION DETAILS :**

**a. SOAKING :**

All bricks shall be immersed in water for two hours before being put into work so that they will be saturated and will not absorb water from the mortar.

**b. BATS:**

No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different course and for closers, in which case, full brick shall be laid at comers, the bats being placed in the middle of the course.

**c. LAYING :**

The bricks shall be laid in mortar to line level and shapes shown on the plans, slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar and no hollows left anywhere. Bricks shall be handled carefully so as not to damage their edges. They should not also be thrown from any height to the ground but should be put down gently. All courses shall be laid truly horizontal and all vertical joints made truly vertical. Vertical joints in one course and the next below shall not come over one another and shall not normally be nearer than quarter of a brick length. For battered faces bedding shall be at right angles to the face. Fixtures, plugs, frames etc., if any, shall be built in at places shown in the plans while laying the courses only and not later by removal of brick already laid. Care shall be taken during construction to see that edges of bricks at quoins, walls, heads etc., are not damaged.

The verticality of the walls and horizontality of the courses shall be checked very often with plump-bob and spirit level respectively.



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**d. BOND:**

Unless otherwise specified, brick work shall be done in English bond.

**e. JOINTS:**

Joints shall not exceed 10mm (About 3/8") in thickness and this thickness shall be uniform throughout. The joints shall be raked out not less than 10mm (about 3/8") deep when the mortar is green where pointing is to be done. When the brick surfaces are to be plastered the joints shall be raked to a depth of 5mm when the mortar is green, so as to provide good key to plaster.

**f. UNIFORM RAISING :**

Brick work shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60 cm lower than another. But where building at different level is necessary, the breaks shall be stepped so as to give later a uniform level and effectual bond. Horizontal courses should be to line and level and even and face plumb or to batter as shown on the plan. The rate of laying masonry may be up to a height of 80 cm per day if cement mortar is used and 45 cm (about 18") if lime mortar is used.

**3.4 SCAFFOLDING :**

Scaffolding will be double or single as is warranted for the particular work. Put log holes shall be made good by bricks to match the face work when put logs are removed after ensuring that the holes behind are solidly filled in with 1:4:8 cement concrete.

**3.5 CURING :**

All brick work shall be kept well watered for 14 days after laying. Where pozzolana cement is used for mortar, the curing shall be extended by one week at the Contractor's expense.

**3.6 EXPOSED WORK :**

Where exposed brick work is prescribed, the usual specifications for the "Brick Work" as mentioned above will be applicable for "Exposed Brick Work" but in addition specially selected bricks shall be used for facing, ensuring regular and clean faces of uniform colour. No bricks which are broken, chipped wrinkled on which have irregular edges or corners shall be used. Depending on the quality of bricks and if instructed by the Corporation's Engineers, the exposed face of every brick shall be rubbed before laying without extra charge. Wooden fillets 10 mm thick and 10mm wide shall be placed at the edge of joints so that no mortar comes on the surface of the bricks and a regular thickness of joints is maintained. The surface shall be rubbed down with brushes of bricks if necessary, and thoroughly washed. No mortar shall be allowed to stick to the surface, which shall be left clean to the Corporation's Engineer's satisfaction with all joints even and true to a straight line. Double scaffolding shall be used in exposed brick work.



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### 3.7 **REINFORCEMENT IN HALF BRICK THICK WALLS :**

- a. Half brick thick and brick on edge walls shall be provided with reinforcement consisting of 2 nos, 6mm dia M.S. round bars of 500mm long (each) as dowels, embedded in mortar 15mm thick at every fourth course and securely anchored at their ends where the partitions bonds with the cross walls. The cost of reinforcement in half brick thick and brick on edge walls shall be paid separately unless otherwise stated in the schedule of quantities.

### 3.8 **RATES TO INCLUDE :**

Apart from other factors mentioned elsewhere in this contract, the rate for items of brick work shall include for the following:

- a. All labour, materials, use of tools, equipment and other items incidental to the satisfactory completion of brick masonry at all heights and levels.
- b. Erecting and removing of all scaffolding, ladders and plant required for the execution of the work to the height and depths and shapes as shown on the plan or ordered by the Engineer.
- c. Constructing brick work to lines, levels, batters, pillars, curves and to any position or shape, to any heights or levels including raking of joints and housing frames, fixtures etc.
- d. Curing the brick work.
- e. Removing of all stains and adhering mortar lumps on the brick work surfaces.

### 3.9 **MEASUREMENTS :**

- a. Half brick thick and brick on edge walls shall be measured in Sqm. unless otherwise mentioned.
- b. One brick thick wall and thicker walls shall be measured in Cum. Brick walls up to and including 3 bricks in thickness should be measured if multiples of half bricks which shall deemed to be inclusive of mortar joints. Widths of more than three bricks in walls will be measured actually and limited to the width specified.
- c. No deductions or additions shall be made on any account for :-
  - i. Ends of dissimilar materials (i.e.,) joints, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps etc.) up to 500 cm<sup>2</sup> in section and
  - ii. Openings up to 0.1 m<sup>2</sup> in section.

### **NOTE :**

- I. In calculating the area of openings, any separate lintels or sills be included along with the size of the openings but the end portions of the lintels shall be excluded and the extra width of debated reveals, if any, shall be excluded.
- ii. Wall plates and bed plates, and beating of slabs, CHAJJAS and the like which the thickness does not exceed 10 cm and the bearing does not extend over the full thickness of the wall.



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#### **4. EXTERNAL CEMENT PLASTER WITH SAND FACED/COMBED /ROUGHCAST FINISH**

##### **4.1 PREPARATION OF SURFACE**

The walls to be plastered to have all joints raked out to a depth of 10mm , if not already done, R.C.C. surface shall be properly hacked to get good key to the plaster. Any unevenness shall be leveled before the plastering is applied. All dust and oil matter if any, shall be brushed and cleaned with a stiff bristle or wire brush, and the surface to be plastered shall be kept wet for 6 hours before plastering is commenced. If the surface becomes dry in spots such areas shall be moistured again to restore uniform surface.

##### **4.2 PROPORTION OF MORTAR :**

Unless otherwise mentioned, the proportion of external cement plaster for brick or concrete surface shall be 1:4 (1 cement: 4 sand). Sand shall be from approved source free from foreign matter, washed clean if necessary and shall be as per I.S. 1542- 1977. No more cement mortar shall be prepared than that can be used within half an hour. The mortar may be hand mixed or machine mixed. In hand mixed mortar, cement and sand in the specified proportion shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous and mixture of uniform colour is obtained. Fresh and clean water shall be added gradually through a rose and thoroughly mixed so that mix becomes homogeneous and each particle of sand shall be completely covered with a film of wet cement. Mixing platform shall be so arranged that no deleterious, extraneous material shall get mixed with mortar not the mixing water of the mortar shall flow out.

##### **4.3 APPLICATION OF PLASTER :**

The plastering shall be done in two coats namely under coat and finishing coat.

###### **UNDER COAT :**

The under coat shall be of cement mortar 1:4. Water proofing compound of approved make shall be added according to manufacturer's specifications to make the mortar waterproof. Patches of plaster 15 cm x 15 cm shall be put on about 3 m apart as gauges to ensure even plastering in one plane. The thickness of the under coat in any part shall not be less than 8 mm and more than 12mm. The mortar shall be firmly applied with somewhat more than the required thickness and well pressed into the joints and on the surface and rubbed and leveled with a flat wooden rules to give required thickness. Long straight edges shall be freely used to ensure perfectly plane and even surface. All corners must be finished to their true angles or rounded as directed. Plastering shall be done from top downward. Keys shall be formed on the surface by thoroughly combing it with wavy horizontal lines about 12mm apart and 3mm deep when the mortar is still plastic. Under coat shall be cured for not less than 2 days before finishing coat is applied.



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### **FINISHING COAT :**

Cement mortar for finishing coat shall have washed approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The finishing coat shall be of such thickness as to make total average finish to thickness equal to the required plaster thickness as described. The finishing coat shall be not less than 4mm or not more than 8mm thick. The finished surface shall be true and even and shall be present uniform texture throughout and all joining mark shall be eliminated. After application the surface should be finished with a wooden float lying with cork and tapped gently to retain coarse surface texture. A steel trowel shall not be used and overworking shall be avoided. Water shall not be applied to the surface of the finishing coat while working up, but patches showing signs of premature drying may be patted with a damp float. When the finishing coat has hardened, the surface shall be kept moist continuously for 14 days. In any continuously and day to day breaks made to coincide with Architectural breaks in order to avoid unsightly junctions. All mouldings shall be worked true to template and drawn neat clean and level. All exposed angles and junctions with door frames etc. shall be carefully finished as directed.

**4.4** All plaster work shall be kept moist continuously for a period of 14 days. To prevent excessive evaporation on the sunny or windward side of the buildings in hot dry weather, matting or gunny bags may be hung over on the outside of the plaster in the beginning and kept moist.

**4.5** **RATES TO INCLUDE** : Apart from other factors mentioned elsewhere in the contract, rates for the item of plaster shall include for the following :

- i. Erecting, dismantling and removing scaffolding.
- ii. Preparing the surface to receive the plaster.
- iii. Providing cement plaster of the specified average thickness, in two coats, including waterproofing compound.
- iv. All labour, materials, use of tools and equipment to complete the plastering as per specifications.
- v. Curing 14 days.
- vi. Any moulding work if shown on the drawings or as specified unless separately provided in the tender.
- v. Plaster work in hands, arises, rounded angles, fair edges narrow returns, quirks, 'V' joints, splays, drip mouldings, making good to metal frames, junctions with skirting or dados, narrow widths and shall quantities, making good and pipes, conduits, timbers, sills, brackets railings, etc. and making good after all the subcontractors or nominated sub-contractors have done their work.



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#### 4.6. **MODE OF MEASUREMENT :**

All plastering work shall be measured in square metres. Dimensions shall be measured and quantity worked out correct upto two places of decimals in metre and square metre respectively. If the average thickness of plaster provided by the contractor is more than what is specified on any account, no extra payment will be made. For jambs, soffits, sills, etc. for openings not exceeding 0.5m<sup>2</sup> each in area ends of joists, beams posts, etc. not exceeding 0.5m<sup>2</sup> each in area and openings not exceeding 3m each deductions and additions shall be made in the following manner :

- a. No deduction shall be made for ends of joints, beams, posts, etc. and opening not exceeding 0.5m<sup>2</sup> each, and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finishing the plaster around ends of joists, beams, posts etc.
- b. Deductions for openings exceeding 0.5m<sup>2</sup> but not exceeding 3m<sup>2</sup> each shall be made as followed and no addition shall made for reveal, jambs, soffits, sills, etc. of these openings :
  - i. When both faces of wall are plastered with the same plaster, deduction shall be made for one face only.
  - ii. When two faces of wall are plastered with different plasters or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing on the side of frames for doors, windows, etc. on which the width of reveals is less than that on the other side, but no deduction shall be made on the other side.

In case of openings of area above 3m<sup>2</sup> each, deductions shall be made for the openings but jambs, soffits and sills shall be measured.

#### 4.7 **COMBED FINISH :**

All the specification given above for sand finish shall apply to this as well except that in the case of combed finish, the finishing coat will be treated to have combed texture of approved pattern.

#### 4.8 **ROUGH CAST FINISH :**

- a. All the specifications given above for sand faced finish shall apply to this as well except for the application of plaster which is described below.

#### b. **APPLICATION OF PLASTER :**

The plastering shall be done in two coats namely under coat and finishing coat. The under coat shall be done same as in case of sand faced finish. The finishing coat shall contain a fairly coarse aggregate and shall be thrown on as wet mix and shall be left in rough condition. The mortar of the finishing coat shall consist of coarse aggregates of crushed stone or fine gravel of size generally 6 to 12 mm as approved by Executive Engineer and specially graded mixture, mixed with approved sand and cement. The proportion of cement to sand and aggregate/gravel shall be generally 1: 1½ : 3 The mortar shall be flung upon the under coat with large trowels to form an even protection coat,. The finishing coat must be applied while the under coat is still soft and plastic. The thickness of the finishing coat shall be about 12mm unless otherwise specified.



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## **5. WHITE WASHING, COLOUR WASHING AND DISTEMPERING:**

### **5.1 WHITE WASHING :**

#### **A. MATERIALS:**

White wash shall be prepared from fresh burnt fat lime. The lime shall be dissolved in a tub with sufficient quantity of water (about 4/5 litres/kg. of lime) and the whole thoroughly mixed and stirred until it attains the consistency cream. The wash shall be taken out in small quantities and strained through a clean coarse cloth. Clean gum dissolved in hot water shall then be added in suitable proportion of two grams of gum arabic to a litre of lime to prevent the white wash coming off easily when rubbed. Rice seize may also be used instead of gum, gum Regd. Neel colour added for whiteness.

#### **B. SCAFFOLDING:**

This shall be double or single according to requirements and as directed. If ladders are used pieces of old gunny bags or cloth bags shall be tied on their tops to avoid damage or scratches to the plastered surfaces, etc. proper stage scaffolding shall be erected when white washing the ceiling

#### **C. PREPARATION OF SURFACE:**

The surface shall be prepared by removing all mortar droppings and foreign matter other means as may be ordered by the corporation's Engineers to produce an approved clean and an even surface. All loose pieces and scales shall be scraped of and holes, cracks etc. stopped with mortar to match with the surrounding finish. In case where the surfaces have been previously white washed or colour washed, the old white or colour wash shall be entirely removed and surfaces broomed down before the new white wash is applied. In case the old white wash cannot be removed by brooming, the surfaces shall be cleaned by scraping.

#### **D. APPLICATION OF WHITE WASH :**

On the surface so prepared, the white wash shall be laid on with a brush. The first stroke of the brush shall be from top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush before it dries. This will form one coat. Each coat must be allowed dry and shall be subject to inspection and approval before the next coat is applied. When dry, the surface shall show no signs of cracking. It shall present a smooth and uniform finish free from brush marks and it should not come off easily when rubbed with a finger. Minimum 3 coats of white wash shall be applied.



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No portions in the surface shall be left out initially to be patched up later on. For old work, patches and repairs shall be white washed first. Thereafter, the whole surface shall be white washed with the required number of coats. For new work, the white washed surface shall present a smooth and uniform finish. Doors, windows, floors and other articles of furniture, etc shall be protected from being splashed upon. Splashing, droppings, if any, shall be removed and the surfaces cleaned.

**E. RATES TO INCLUDE :**

Apart from other factors mentioned elsewhere in this contract, the rates for white wash shall include for the following.

- i. All labour material, equipment required for white washing.
- ii. The surface for white wash including the scaffolding. Scaffolding including erection and removal.
- iii. Providing and preparing the white wash.
- iv. Preparing
- v. Applying the white wash in three coats minimum. If a proper even surface is not obtained to the satisfaction of the Executive Engineer in 3 coats, contractor shall carry out additional coats of white wash to approval at Contractor's expenses.

**F. MODE OF MEASUREMENT :**

The measurement shall be in sq. metre. The mode of measurement shall be as applicable to that for plaster.

**5.2 COLOUR WASH :**

**MATERIAL :**

This shall be prepared by adding approved colouring matter to the white wash (prepared for white washing) according to that required. In all other respects the same conditions and specification as applicable to white wash shall also be applicable to colour wash.

**5.3 DISTEMPERING :**

POWDERED/DRY DISTEMPER:

**a. MATERIAL :**

The powdered/dry distemper shall be of approved colour and shade manufactured by M/s Blundell Eomite or other equivalent and approved.



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**b. SCAFFOLDING :**

This shall be double or single as required and directed.

**c. PREPARING THE SURFACE :**

The surface to be distempered shall be cleaned and all cracks, holes and surfaces defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand prepared smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distemping is commenced. In the case for walls newly plastered, special care shall be taken to see that it is completely dry before any treatment is attempted. For the old surface which had earlier been distempered, the surface shall be cleaned of grease dust etc. the flaking of previous coatings, if any, shall be taken off. all cracks, holes, and surface defects shall be repaired with gypsum and allowed to set hard and then sand prepared smooth and wiped clean. But in case the surfaces are coloured or white washed, the wash must be removed thoroughly first.

**d. PRIMING COAT:**

The priming coat shall be applied over the completely dry surface in the manner recommended by the makers in the case of patent distempers. When no priming coat is specified by the manufacturer a finely powdered chalk mixed with a thin solution of glue shall be applied to prepare a good, hard background the coating when dry being sand prepared as clean and smooth as possible.

**e. APPLICATION OF DISTEMPER :**

The instructions of the makers shall be followed regarding the preparation of the surface and application of priming and finishing coats. Distemper shall not be mixed in a larger quantity than is actually required for a day's work. Hot water should be used to prepare the mixture. Distempers shall be applied in dry weather with a broad stiff brush in long parallel strokes. The treated surface shall be allowed to dry and harden. Second or succeeding coats shall not be applied until the proceeding coat has been passed by the Executive Engineer. Two more coats of distemper shall be given in exactly the same manner as the first one but only after the earlier coat laid has thoroughly dried.



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**f. RATED INCLUDES :**

The rate shall include all labour, materials, equipment and tools for carrying out the following operations:

- i. Providing the primer and distemper and mixing the distemper.
- ii. Scaffolding.
- iii. Preparing the surface to receive the priming and finishing coats.
- iv. Applying the priming coat.
- v. Applying the distemper in 3 coats minimum. If a proper even surface is not obtained to the satisfaction of the Executive Engineer in 3 coats, Contractor shall carry out additional coats of distemper to approval at contractor's expense.

**g. MODE OF MEASUREMENT :**

Similar to that for white washing.

**5.4 OIL BOUND DISTEMPER :**

The specification and conditions for this shall be the same as that applicable for dry distemper above except that oil bound distemper or approved make, shade and colour shall be used after applying priming coat of petrifying liquid or other primer as may be recommended by the manufacturers of distemper or as directed.



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## **6. WHITE GLAZED TILES IN FLOORING AND DADO**

### **6.01 TILES**

White glazed tiles including specials shall be of approved make and quality and shall conform to IS-777-1961 in all respects. Samples of tiles shall be got approved by the Chief Engineer, who will keep them in his office for verification as to whether the materials brought for use conform to the approved samples. White glazed tiles shall be of the size 152x152x 5 mm.

### **6.02 MORTAR BEDDING :**

Unless otherwise specified the tiles in Flooring shall be laid In the cement mortar 1:6 bedding . The amount of water added shall be minimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that would interfere with the even bedding of the tiles. Before spreading mortar, sub-floor or base shall be cleaned of all dirt, scum, loose materials and laitance if any, by scrubbing with coir or steel wire brush or by hacking if necessary and then well wetted without forming any pools of water on the surface. Before laying, the mortar , the sub-grade shall be got approved by the Executive Engineer in case of R.C.C. floors, the top shall be left a little rough. All points of level for the finished paving surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens only over so much area as will be covered with tiles before the setting of the mortar. The thickness of the mortar bed shall not be less than 20 mm.

### **6.03 LAYING, FINISHING, CURING AND CLEANING :**

The tiles before laying shall be soaked in water for at least 2 hours. Tiles which are fixed in the floor adjoining the wall shall be so arranged that the surface of the round edge tiles shall correspond to the skirting or dado. Neat cement grout of honey like consistency shall be spread over the bedding mortar just to cover so much area as can be tiles within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed of joints. The joints shall be kept as close as possible and in straight lines. The joints between the tiles shall not exceed 1.5mm wide. After fixing the tiles finally in an even plane, the flooring shall be covered with wet saw dust. The tile flooring shall be cured for 14 days.

After the tiles have been laid in a room or the day's fixing work is completed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set,



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the floor shall be covered with oil free dry saw dust which shall be removed only after completion of the construction work and just before the floor is occupied.

#### **6.04 RATES TO INCLUDE :**

Apart from other factors mentioned elsewhere in this contract, the Contractor's rate quoted include for the following.

- i. Cleaning the base and providing and laying bedding mortar and levelling.
- ii. Providing and fixing the tiles including all specials like round edges corner cups, angles etc. in neat cement float over the bedding mortar.
- iii. Filling the joints of tiles with neat white cement slurry.
- iv. Finishing, curing and cleaning.
- v. All labour, materials and use of tools for carrying out the items as specified above.

#### **6.05 MODE OF MEASUREMENT :**

Measurement for flooring tiles shall be in square metres as provided.

#### **6.06 WHITE GLAZED TILES DADO :**

##### **a. TILES**

White glazed tiles shall be same as described under white glazed tiles flooring.

##### **b. MORTAR BACKING :**

All joints in the face work shall be raked out to a depth equal to not less than the width of the joints or as directed by the Executive Engineer. Concrete surfaces shall be properly hacked. All dirt, soot oil, or any other material that might interfere with satisfactory bond shall be removed. The surface shall be cleared and scrubbed with fresh water and kept wet for 6 hours prior to applying backing mortar. The dado work shall not be commenced unless the preparatory work is passed by the Executive Engineer. The proportion of mortar bedding shall be 1:3 cement mortar. Sand in mortar bedding shall be from approved source, and shall conform to I.S.1542-1960 as applicable to internal wall and ceiling plastering and external wall plastering. The thickness of mortar backing shall not be less than 12mm and not more than 20mm.



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**c. FIXING DADO TILES :**

Dado work shall be done after fixing tiles on the floor. The white glazed tiles shall be soaked in water for atleast 2 hours before being used for dado work. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of tiles shall be covered with a thin layer of neat cement paste and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from bottom of wall upwards without any hollows in the bed or joints. Each tile shall be fixed as close as possible to the one adjoining. The tiles shall be jointed with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar so that all tiles faces are in one vertical place. The joints between the tiles shall not exceed 1.5mm in width and they shall be uniform. The tiles shall be fixed with straight joints. After fixing the dado, they shall be kept continuously wet for 14 days. If doors, windows or other openings are located within the dado area, the sills, jambs angles etc., shall be provided with white glazed tiles and appropriate specials according to the foregoing specification and such tiled area be measured net along with the dado.

**d. CLEANING :**

After the tiles have been fixed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting work shall be washed thoroughly clean.

**6.07 RATES TO INCLUDE :**

Apart from other factors mentioned elsewhere in this contract, the rates for the item or dado or skirting shall include the following:-

- i. Backing mortar.
- ii. Providing and fixing tiles including all specials like round edges, angles, capping etc. in neat cement float over backing mortar.
- iii. Jointing of the tiles with white cement slurry.
- iv. Curing.
- v. Cleaning.
- vi. All labour, material, use of tools and equipments for carrying out the items as specified above.

**6.08 MODE OF MEASUREMENT :**

Dado shall be measured in square metres as provided.



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## TECHNICAL SPECIFICATION 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. 732: 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 FRLS 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 L.I.C.I.
  - ii) Within one month of taking over of the installation, the contractor shall submit to L.I.C.I. 3sets of completion drawings of the Electrical Installation in corpora ting all modifications made from time to time including cable & conduit lay-outs to the satisfaction of the Electrical Engineer of L.I.C.I. & 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 FRLS insulated or FRLS insulated FRLS sheathed. The minimum sections of conductors used for wring of light and plug points shall be 1.5 sq mm. Single core wires shall only be used.
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.



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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.

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' 8<sup>th</sup>, 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).



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**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.
- 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.



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- 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 L.I.C. '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.
- 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.



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- (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.



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## **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
- 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 FRLS 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, L.I.C.
- 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.



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## **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.

**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.



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- 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.

## **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.



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## **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.
- 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.



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## **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.
- 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.



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- 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 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.



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## **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.

### **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.

7.2.1 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.



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- 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.
- 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.



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- 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 amour. Cable gland shall be bonded to earth.
- 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.



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## **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 conform to IS 3043, Indian Electricity Act and Rules and relevant regulations. The work of Lightning protection shall conform to IS 2309.

#### **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.



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- 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.

#### **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.



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- 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.
- 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.



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**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.

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



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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.

**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.



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- 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.
- 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 amour 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



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



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- 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 smoothed 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 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.



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- 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.
- 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.



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**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.



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## 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

**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.



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## 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 Architect, 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 Architect. The test results shall be recorded on prescribed forms. The test 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



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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 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.



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### 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.

### 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.



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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.

#### 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.



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#### 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 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.



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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.

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.



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**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.

**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.



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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.

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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## **APPENDIX TO GENERAL INSTRUCTIONS TO CONTRACTORS**

Name and Location of the proposed work:

**NAME OF WORK: *E-TENDER FOR PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL.***

**BUILDING NAME : THE SAID FLAT SITUATED AT QUEENS MANSION HERRITAGE BUILDING, PARK STREET, KOLKATA AND REQUIRED TAKE NECESSARY PRECAUSION/PRIOR PERMISSION FOR DISMANTLING OF THE EXISTING STRUCTURE. IS TO BE OBTAINED FROM LIC AND ALSO TAKE PERMISSION FROM SECURITY OFFICER. NECESSARY PRECAUTIONS IS TO BE TAKEN FOR SOUND NOISE DURING EXECUTION OF WORK.**

**(SIGNATURE OF THE CONTRACTOR)**



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## **SPECIAL CONDITIONS:**

### **1. PHOTOGRAPHS AND VIDEOS OF THE CONSTRUCTION WORK**

- 1.1 The contractor shall submit 3 sets of the prints of the photographs size 4" x 6" to LIC of India on the following stages:
- i) Before start the work of the structural work including painting of entire building.
  - ii) Scaffolding & Dismantling of plaster/concrete surface where plaster/ concrete or any treatment can be taken up.
  - iii) After plastering/ concrete/any treatment of every stages.
  - iv) Scrapping of existing surface to accept the wall putty.
  - v) After applying of wall putty of entire surface.
  - vi) Applying of Primer of entire surface.
  - vii) Painting of 1<sup>st</sup> coat, 2<sup>nd</sup> coat or more coat respectively..
  - viii) Final photography of entire building after completion of work.

The photographs can also be submitted in CD / DVD/Pen Drive in lieu of printed photographs.

3. All the Rules, Regulations and Provisions of Government of India are applicable in this tender.
4. Tenderers will quote their rate after proper inspection of the work site. Tenderer has to quote their rates *on Percentage rate basis* for this work including cost of all materials, labour, transportation along with costs for Scaffolding upto 8 m height (free of cost), Curing and necessary testing of the work, taxes, profits and overheads etc.
5. The contractor will take all initiative and make necessary liaisoning with the Local Authority for obtaining permission if required. No extra payment will be paid for this purpose. The tenderer has to quote his rate accordingly.
6. The contractor shall make it a point that he should do the execution work inside the office before and after office hours without disturbing smooth functioning of the official activities. If necessary the contractor may be allowed to do the work in the night also and in that case necessary permission shall be obtained from Local Authority if required at own cost. The contractor will take care of the damages, safety & security of the office records, machineries and electrical/electronic installation works etc. of the offices. He will arrange to cover up the office records, machineries and electrical/electronic installation works etc. by thick polythene sheets to protect probable damages during work and will arrange necessary cleaning of the offices regularly after work for which no extra payment will be made to him. The tenderer has to quote his rate accordingly.
7. During progress of the work necessary arrangement has to be made by the contractor at his own cost to protect from rain, if occurred.



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8. All type of security measures related to the external work to be arranged for the Workmen and public.
9. For Scaffolding and barricading the footpath for external work, necessary permission shall be obtained from Local Authority if required at own cost. Covering of the external wall by thick polythene sheet/ gunny bags to be done suitably by the contractor.
10. Before commencing the work, labour license, Workman Compensation & Contractor's All Risk including Third party Liability Policies are to be obtained and submitted to the department. **The above policies shall be in the joint name of LIC of India and Contractor.**
11. The contractor shall follow C.P.W.D coefficient for consumption of cement sand & stone chips etc.
12. Necessary electricity and water to be arranged by the contractor at their own cost. Alternatively if those have been used from the sources of LIC, 0.50% on gross value of bill will be deducted from their bill.
13. Before commencement of the work, contractor has to prepare and submit necessary steps for design & drawing of the work for approval by the Deptt.
14. Before commencement of the work, contractor has to submit to the Deptt. samples of all materials, fittings and fixtures etc to be used in the work of good quality of reputed brand and manufacturer out of the Principal Makes and to be got approved from the Deptt.
15. No extra item shall be entertained until and unless approval is obtained from the LIC. In case of any addition/alteration required to be done, approval/ permission in writing to be obtained from the LIC. In such cases payment should be made after price adjustment for use of alternative materials on production of cash memo in original.
16. After completion of work joint inspections shall be carried out by the Contractor with LIC of India's representative to find out defects of the works if any. In case, any defects are noticed, the same shall be rectified by the Contractor up to the full satisfaction of the Deptt. without any extra cost to the Deptt.
17. All damages to the property while carrying out the work shall be made good in all respect within the completion period without any extra cost to LIC.
18. Final payment will be made only after satisfactory completion of the total work in all respect after obtaining virtual completion certificate from the Deptt.
19. There may be space congestion in the existing building which may create problem in storing of material. Tenderer are therefore advice to inspect the building and premises thereof and satisfy themselves before quoting the rates.
20. The Contractor should be taken all safety measures at site by using safety belt, helmet and other accessories as per site condition.



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21. Structural repairing work shall be carried out thorough the surface and take permission from the Department for they can do further course of action. The external putty & painting of the building should be carried out after thorough repairing of the surface
22. Colour scheme has to be prepared through the paint manufacturer and approval to be taken from the Competent Authority prior to taking up of the work.
23. During external painting, the contractor has to obtain clearance after each stages of work i.e. repairing, priming & surface preparation, application of 1<sup>st</sup> coat & application of 2<sup>nd</sup> coat.
24. For consumption of materials, the department may ask for Cash Memo/Bill/Invoice from the contractor for justification and the contractor is bound to submit the same on demand.
25. One approved sample of the colour scheme will be prepared on wall surface for calculating actual consumption of primer and external paint in presence of LIC Engineer. On the basis of the same, the total consumption will be calculated and the contractor has to purchase and apply the said quantity. The empty drums of the paint & primer will be kept in safe custody till completion of the work and will be reconciled.
26. The repairing of the external surface will be done as per instruction. Documentary photographs of the repaired surface will be taken and kept for record on each side at each stage. The contractor has to obtain clearance from LIC Engineer after record of repairing measurement and surface preparation before application of each coat of paint.
27. The contractor has to submit bill/s against purchase of all wall putty/paint/primer for reconciliation. The representative of the Approved Manufacturer of paint will make periodical site inspection for quality control and also give a certificate of satisfaction after completion of work in respect of quality and workmanship of painting.
28. Special care to be taken to avoid any unwanted incident and to provide net/polythene sheet for safety and security.
29. Quantity of each items are tentative. No extra item shall be allowed due to variation of increase/decrease the quantity in any extent.
29. **APPLICABILITY OF MSME PROVISION ON WORKS CONTRACT:**  
 Works contract does not falls within the ambit of Public Procurement Policy-2012 and MSME Act. Hence benefits under Public Procurement Policy for MSMEs shall not be extended against tender for "**WORKS CONTRACTS**".



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30. **REGISTRATION UNDER CENTRAL GOODS & SERVICE TAX ACT 2017 ON WORKS CONTRACTS.**

"All the participating Bidders must have valid GST Registration Certificate of a particular State/Union Territory at the time of submission of the Bid. In the eventuality of not having valid GST Registration Certificate with the State/Union Territory, where implementing Works Contracts, the successful bidder will be required to obtain GST Registration Certificate of that particular State/Union Territory where the Works Contract will be implemented within a period of 21 days from the date of issuance of Letter of Acceptance, failing which the letter of Acceptance will be withdrawn and cancelled. Earnest Money deposit will also be forfeited. No extension of time period will be given whatsoever unless there remain unforeseen impediments with the issuing Authority of such GST Registration."

**(SIGNATURE OF THE CONTRACTOR)**



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## GENERAL PREAMBLES TO SCHEDULE OF QUANTITIES

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 Corporation's Engineer and for Establishment Charges, overheads and profits. The Contractor shall provide at his expense all labour, materials and things required by the Corporation's Engineer 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 procedures 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".
- 1.5 **Rates quoted shall include for hoisting to any height and the work at all levels and lifting of Materials and working at any height shall not form any criterion for any extra claims, except where otherwise specified in Schedule of quantities.**

### **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 Chief Engineer 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.





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- i) Name of the work
- ii) Agreement No & date / Contract Ref:
- iii) Name of the Construction Associate & address
- iv) Name, Designation of LIC measurer with S.R. No
- v) Period of measurement
- vi) Name of the Construction Associate's authorised Engineer/s attending measurement.
- vii) Name of the Construction Associate's authorised Authorisation letter ref:

E-MEASUREMENT SHEET (Reinforcement)  
 R.A. BILL..... / FINAL BILL

Location Description and size of RCC Member.	Number of RCC members	Sketch of reinforcement bar and position in RCC member if possible to draw.	Reinforcement bar as marked on the drawing / Position of bar	Number of bars	Length of bars	Total length of bars, col (2)x(5)x(6)	Remarks										
							8 mm	10 mm	12 mm	16 mm	20mm	25mm	32mm				
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

Signature of Construction Associate's Engineer:  
 (Name)

Signature of LIC Site Engineer  
 (Name & S.R. No)

*[Handwritten Signature]*

Signature of LIC Test Checking Engineer  
 (Name & S.R. No)

Annexure-A2







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## LIST OF PRINCIPAL MAKES /AGENCIES/BRANDS OF VARIOUS MATERILAS.

Sr. No.	MAKES /AGENCIES / BRANDS	Sr. No.	MAKES /AGENCIES / BRANDS
1	GI PIPES	2	GI PIPE FITTINGS
	Jindal		R- Brand
	Zenith		K. S. Brand
	c. Apollo		c. Zoloto
	d. GST		d. RR
	e. Surya Prakash		e. SSS
	f. QST		f. NMC
	g. Tata		g. Unik
			h. Surya
3	COPPER PIPES / TUBES	4	MULTILAYER COMPOSITE PIPES
	Rajco Metal Industries		Ki TEC
	b. B. P. Conex		Kisan
	c. Comap		
5	PVC PIPES & FITTINGS	6	UPVC (UNPLASTICIZED PIPES & FITTINGS)
	Chemplast		Prince
	Prince		Supreme
	Supreme		Paras
	Finolex		Precision Pipes
	Oriplast		e. Kelvin
	Precision Pipes		
	g. Kelvin		
7	CPVC PIPES & FITTINGS	8	GATE VALVES, GLOBE VALVES
	a. Supreme		Leader
	b. Precision Pipes		Kirloskar
	c. Kelvin		Zoloto
	d. Prince		Orient
	e. Astral		
	f. Flowguard		
9	FOOT VALVES, CHECK VALVES	10	WATER METER
	Kirloskar		Capstan
	Leader		Anandaasahi
	Ashoka		Dasmesh
			Remco
11	FERRULES	12	BIB COCKS, STOP COCKS, PILLAR TAPS ETC
	Leader		Jaguar
	HINDCO		Marc
	Neta		Essco
	Annapurna		ARK
			GEM
			CERA



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13	FLUSHING CISTERNS (PVC / CERAMIC)	14	VITREOUS SANITARY WARE LIKE IWC, WASH BASIN, URINALS, EWC ETC.
	Parryware		Parryware
	CERA		CERA
	Hindware		Hindware
	Commander		Neycer
			e. RAK
			f. Jaquar
15	PLASTIC SEAT & COVER	16	BATHROOM FITTINGS
	Commander		Jaguar
	Parryware		ESSCO
	Bestolite		Gem
	Duroshine		Ark
	e. Jaquar		Marc
			CERA
			g. RAK
17	CI PIPES & FITTINGS	18	CI NAHANI TRAP
	Hind.		BIC
	Bic		SKF
	Neco		NECO
	RPMF		RAJCO
			RPMF
19	CI MANHOLE COVER	20	SW PIPE
	a. RPMF		HIND
			PERFECT
			BURNS
21	PVC CABINET MIRROR	22	SLUICE VALVE
	Commander		Leader
			Kirloskar
23	HDPE / LDPE / LLDPE WATER STORAGE TANKS	24	HDPE PIPES & FITTINGS
	Sintex		a. Kelvin
	Polycon		b. Prince Pipe & Fittings
	G&P		
	Prince Pipe & Fittings		
25	CERAMIC /GLAZED TILES	26	VITRIFIED TILES
	NITCO		NITCO
	Kajaria		Kajaria
	Euro		RAK
	H. R. Johnson		Euro
	Somany		e. Somany
	f. Oriental Bell Ltd.		Oriental Bell Ltd.
	g. Asian granite India Ltd (AGL)		Asian granite India Ltd (AGL)
	h. CERA		Vermora



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	i. RAK		H. R. Johnson
	j. Vermora		CERA
27	PLYWOOD (BWR), BLOCK BOARD	28	FLOAT GLASS
	Archid		Saint Gobain
	Green Ply		Modi Guard
	Century Ply		Triveni Sheet Glass
	Bhutan Board		Indo Asahi Glass Co.
	Sharon		Tata
	Anchor		Atul
	Swatstik		
	National		
	Samrat Plywood Ltd		
	Green Panel		
	Merino		
	Austin		
	Kalpataru		
	Duro		
29	CALCIUM SILICATE BOARD / FIBRE CEMENT BOARD & ACCESSORIES	30	PVC DOORS AND DOOR FRAMES
	a. Hilux (Ramco)		Rajshri
			Sintex
			Supreme
31	ALUMINIUM EXTRUDED SECTIONS	32	WPC DOOR, DOOR FRAMES & WINDOWS, UPVC SOLID DOOR
	Jindal		a. Qute
	Indal		
	Hindalco		
33	STAINLESS STEEL KITCHEN SINKS	34	PRE-LAMINATED PARTICLE BOARD
	a. Nirali		Green Lam
	b. Farnkee		Archid lam
	c. Jayna		Swastik
	d. Diamond		Green Panel
	e. Neelkanth		Duro
	f. CERA		Asis
			Heritage Laminates
			Century
35	FLUSH DOOR SHUTTERS	36	DECORATIVE LAMINATES
	a. Kutty Flush doors		Green Lam
	b. Century		b. Merino
	c. Green Ply		c. Sunmica / Formica
	d. Shiva Hari Plywood Ltd. (Corbett)		d. Century



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e. Anchor Ply		e. Durian
f. Swastik Ply		f. Sundek
g. Western India		g. Anchor
h. Parvati Wood		h. Decolam
i. Archid Ply		i. Archid Ply
j. Samrat Plywood Ltd		j. Samrat Plywood Ltd
k. Green Panel		k. Heritage Laminates
l. Merino		l. Asis
m. Austin		m. Green Panel
n. Kalpataru		n. Virgo
o. Duro		

37	FLOOR SPRINGS	38	VENEERS
	Everite		Decowood
	Hardwyn		Euro veneers
	Efficient Gadgets		Durion
	Garness		Green Lam
	e. Dorma		Archid Ply
			Green Panel
			Kalpataru
			Duro
39 i)	MDF BOARDS	39 ii)	HDF BOARD
	Duratuff		a. Green Panel
	Nuwud		b. Asis
	Century		
	Green Ply		
	Green Panel		
	f. Asis		
40	ADHESIVES	41	WOOD PRESERVATIVES
	Fevicol (Pidilite)		Bison
	Araldite		Godrej
	Ciba Giegy		Kot
	Mowiol – HV of Mafatlal		d. Terminator
42	HARDWARE FITTINGS	43	DOOR CLOSERS
	Jyoti		Everite
	Argent		Hardwyn
	C.I.E.F.		Efficient Gadgets
	Classic		Ebco
	Everite		Dorma
	Metaco India		Garness
	JH Aluminum		
	PV Radhakrishna		
	Etalia		
	Hardwin		
44	S S HARDWARE FITTINGS (	45	DRAWER SLIDERS



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	HINGES, FLOOR SPRINGS, DOOR CLOSERS, HANDLES, FURNITURE HARDWARE, LOCKS, PATCH FITTING FOR GLASS, SHOWER PANEL, SLIDING/TOWER BOLT, GLASS RAILINGS)		
	a. Ozone		a. Efficient Gadgets
	b. Hettich		b. Ebco
	c. KICH		c. Etahoa
	d. Godrej		d. Sisco
	e. Dorset		
	f. Magnum		
	g. Yale		
	h. Ebco		
46	LOCKS	47	MIRRORS
	Godrej		Atul
	Golden		Sun
	Efficient Gadgets		Commander
	Mark		Modi Guard
	Sheet		Saint Gobain
	Vision		Globe
	Dorma		CERA
48	WATER PROOFING COMPOUND	49	SPECIAL PROTECTIVE & DECORATIVE FINISH
	Impermo		Snowcem Paints
	Cico		Asian Paints
	Pidilite		Berger
	Roff		Jenson & Nicholson
	Choksey		Kansai – Nerolac
	Hindustan - Ciba –Gagey		ICI
	Accoproof		g. Godawari
	Sika		h. Nippon
	Fosroc		
	MYK Arment		
	Tikidan		
	Berger Home Shield		
	Asian Paints Smart Care		
	Kryton		
50	OIL BOUND DISTEMBER	51	CEMENT PAINT
	a. Asian		Snowcem Plus
	b. Berger		Berger
	c. Jenson & Nicholson		Asian
	d. ICI		Jenson & Nicholson
	e. Kansai – Nerolac		Kansai – Nerolac
	f. Godawari		ICI
	g. Nippon		Godawari



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			Ultratech
52	SURFACE TEXTURE	53	TEXTURED PAINT
	Heritage (Bakelite Hylam Ltd.)		Snowcem India Ltd.-Santex matt
	Spectrum		Asian
			Jenson & Nicholson
			Berger
			Kansai – Nerolac
54	ENAMEL PAINT / PRIMERS / READY MIXED PUTTY FOR WOOD WORK, IRON & STEEL	55	WALL PUTTY
	Asian		Birla wall care
	Berger		Snowcem paints
	Jenson & Nicholson		JK
	Kansai – Nerolac		Asian Paints
	ICI		Berger
	MRF		
	Godawari		
	h. Nippon		
56	EXTERIOR EMULSION	57	CEMENT CONCRETE PIPES
	Asian Paints-Apex		The Indian Hume Pipe
	Berger Paints		Premiere Pre-stressed Co.
	Kansai – Nerolac		
	MRF		
	Jenson & Nicholson		
	ICI		
	Godawari		
	Nippon		
58	EXPANSION JOINT BOARD	59	FALSE CEILING (Gypsum)
	Shalimar Tar Products		a. USG Knauf
	Lloyds insulations		b. Gyproc Saint Gobain
	Fosroc		
	Shalitex		
	Pidilite		
60	FALSE CEILING (METAL)	61	MINERAL FIBRE CEILING
	a. Saint Gobain		a. Daiken
	b. Hunter Douglas		b. USG Knauf
	c. Armstrong		c. Armstrong
	d. Faneline		
	e. USG Knauf		
62	CSB FALSE CEILING	63	VERTICAL BLINDS
	a. Aerolite		a. Vista Levlor
			b. Trac
			c. Mac
			d. MARVEL
64	PLASTICIZER, SUPER PLASTICIZER, ADMIXTURES & OTHER CONSTRUCTION	65	ADHESIVE FOR TILE FIXING



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	CHEMICALS.		
	a. Asian Laboratories		a. Roffe
	b. CICO		b. Balendura
	c. Ultracon		c. Cera Bond
	d. Fosroc		d. Fosroc
	e. Sika		e. Choksey Chemicals
	f. Kunal Conchem		f. Dr.Fixit
	g. Pidilite		g. Sika
	h. BASF		h. Sunanda
	i. ECMAS		i. Ferrous Crete
	j. MYK Arment		j. BASF
	k. Kryton		k. MYK laticrete
			l. CICO
			m. Berger Home Shield
			n. Asian paints Smart Care
66	LIQUID/ SELF ADHESIVE MEMBRANE	67	PAVING TILES
	a. Asian Paints Ltd		a. Eurocon
	b. Ardex Endura		b. Ultra
	c. Fosroc		c. Duracrete
	d. Pidilite		d. Unistone
	e. MYK Arment		
68	PVC FLOORING	69	VINYL FLEXIBLE FLOORING
	a. Flora		a. Wonder floor
	b. Armstrong		b. Armstrong
			c. Bhor
			d. Rikvin
			e. Tusker
70	FIBRE GLASS DOOR	71	Soft Board
	a. Master Craft		a. Jolly Board
72	SCREW	73	FIBRE REINFORCED COMP. DOOR
	a. Nettlefold		a. Loknath Unique
	b. GKW		
74	CEMENT	75	Steel
	Brands produced by any company, who is a Member of Cement Manufacturers Association.		a. SAIL
			b. Vizag Steel
			c. Tata Steel
			d. JSW
76	SPECIALISED WATERPROOFING AGENCIES	77	STRUCTURAL GLAZING AND ACP WORK
1	India Water proofing Co. 3rd Floor, Rohit Chambers, Janmabhoomi Marg, Mumbai G.P.O(fort), Mumbai Tel.: 022 2287 1156		Glass : Monolithic heat-strengthened / Insulated / laminated / Tempered glass. a. Asahi India Glass Ltd. b . St. Gobain India



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2	Likproof India Pvt Ltd. 2nd floor, Cecil Court, Mahakavi Bhushan Marg, Colaba, Next To Regal Cinema, Colaba Mumbai 400039, 022 2202 0083		Aluminium Extrusions. a. Jindal b. Hindalco c. Indal d. Global Aluminium e. Bhoruka
3	The Perfect waterproofing Co, 6637/6, Kothi Mem, Bara Hindu Rao, Delhi-110 006, Delhi – 110006 Tel.:(011)9711804217, 9312630094		Aluminium Composite Cladding Panels a. Alcobond b. Aluma c. Durabuild d. Euro e. Virgo f. Timexbond g. Alutech h. Alstrong i. Aludecor j. Alcopanel k. Alpolic l. Alubond
4	Oversee Waterproofing Corporation 2nd Floor, Baldota Bhavan, 117, M Karve Road, Churchgate, Mumbai-400020, Tel.:022 2205 3827		Expansion anchors with SS 316 Screw, Bolts & Nuts. a. Hilti b. Fischer c. Arrow d. Kundan
5	M/s New Asia Water Proofing Co, Mohiyuddin Khan, Gaour Mohallah, Roshan Ganj, Sikar, Raj. (332001)		Chemical anchors a. Hilti or approved equivalent
6	M/s. Asian Waterproofing Co. , 347/CT Road, Salkia, Kolkatta -6 (The agency is debar for 5 years (20.6.2020 to 20.6.2025 as approved by the then CE, CZO vide note ref CZ/Engg/Biaora dated 18.06.2020 )		Door & Window furniture: a. 4 point lockset : GIESSE or approved equivalent. b. S.S friction hinges : Cotswold, c. Patch fittings / Spider Fittings: Dorma , Windor, Kich d. Floor Spring, handle etc : Dorma e. Adhesive film : 3 M, Birla or approved equivalent
7	M/s. M.R. Consultants & Constructions, Universal House, D-187, Vaibhav Khand, Gomati Nagar, Lucknow .		Structural Sealant : Dow Corning, GE – Two Part
			Weather Sealant : Dow Corning, GE
			Foam Spacers and Mounting Tapes: Norton
			EPDM : AMEE Rubber Industries or



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			approved equivalent
			Insulation : U.P. Twiga, Lloyds Insulation or approved equivalent

LIST OF PRINCIPAL / APPROVED MAKES FOR ELECTRICAL WORKS

Sr. No.	MAKES /AGENCIES / BRANDS	Sr. No.	MAKES /AGENCIES / BRANDS
1	COPPER CONDUCTOR PVC INSULATED FR GRADE WIRES	2	PVC INSULATED ARMoured CABLES (LT/HT)
	a. Finolex		a. Finolex
	b. Havells		b. Fort Gloster
	c. V Guard		c. CCI
	d. R R Kabel		d. R R Kabel
	e. KEI		e. Delton
	f. Svarn		f. KEI
	g. Rallison		g. Havells
	h. Polycab		h. Svarn
	i. Delton		i. Rallison
			j. Polycab
334333	MAIN SWITCH WITH HRC FUSES	4	MAIN SWITCHES WITH REWIREABLE FUSE
	a. L&T		a. L&T
	b. Siemens		b. Crompton
	c. Havells		c. Havells
5.	MCCB	6	MCB/ELCB/ELMCB/DB
	a. Siemens		a. Legrand
	b. L&T		b. Siemens
	C. Schneider-MJ		c. Schneider-MJ
	d. Legrand		d. L&T
	e. Havells		e. Havells
7	CHANGE OVER SWITCH /SWITCH FUSE UNIT UPTO 100AMP	8.	CHANGE OVER SWITCH /SWITCH FUSE UNIT ABOVE 100AMP,
	a. HPL		a. HPL
	b. L&T		b. L&T
	c. Havells		c. Siemens
	d. Siemens		d. Havells
9	RISING MAINS	10	PVC CONDUIT( ISI MARK)
	a. GEC		a. Precision
	b. Schneider -MJ		b. Avon plast
	c. L&T		c. Essarke
	d. Siemens		d. Sudhagar
	e. Legrand		e. Kalinga
			f. AKG



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			g. Finolex
11	PVC CASING CAPING	12	M. S. CONDUIT
	a. Precision		a. Supreme
	b. Kalinga		b.BEC
	c. AKG		c.NIC
	d. Sudhakar		d. AKG
	e. Diamond		
	f. Modi		
13	FLOOR TRUNKING SYSTEM	14	G. I. PIPE
	a. Legrand		a. Jindal
	b. Honey well		b. Senith
	c. Precision		c. Prakash
	d. Modi		d. TATA
			e.GST
			f. Apollo
15	MODULAR SWITCHES, ACCESSORIES &ELECTRONIC REGULATOR	16.	NON MODULAR SWITCHES , ACCESSORIES &ELECTRONIC REGULATOR
	a. Anchor		a. Anchor
	b. SSK		b. Leader
	c. Leader		c. SSK
	d. Havells		d. CPL
	e. Honey Well		e. Havells
	f. L & T		f. L & T
17	INDUSTRIAL PLUG &SOCKET	18 i)	CEILING /EXHAUST /WALL FAN
	a. Legrand		a. Usha
	b. Havells		b. Crompton
	c. Crompton		c. Orient
	d. L&T		d. Bajaj
	e. Anchor		e. Almonard
	f. Honey well		f. Havells
			g. Rallison
18 ii)	BLDC FANS	19	INDOOR LIGHT FITTINGS / LAMPS
	a. Usha		a. Philips
	b. Crompton		b. Wipro
	c. Orient		c. Crompton
	d. Bajaj		d. GE
	e. Almonard		e. Havells
	f. Havells		f. Osram
	g. Rallison		g. Bajaj
	h. Atomberg		h. Elenserve
			i. Jaquar
			j. Banburry
20	OUT DOOR LIGHT FITTINGS / LAMPS	21	CABLE GLANDS
	a. Philips		a. Comet



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	b. wipro		b. Dowells
	c. Crompton		c . Braco
	d. GE		d. Siemens
	e. Havells		
	f. Osram		
	g. Bajaj		
	h. K-LITE		
	i. Elenserve		
	j. Jaquar		
	k. Banburry		
22	LUGS	23	CONNECTORS
	a. Dowells		a. Elmex
	b. Comet		b. Connectwell
	C. Braco		c. Phoenex
			d. Wago
24	MOTOR STARTER	25	MONOBLOCK PUMP
	a. Siemens		a. Kirloskar
	b. L & T		b. Crompton
	c. Crompton		c. CRI
	d. kirloskar		d. Wilo
	e. Texmo		e. Grundfos
	f. Suguna		f. Texmo
	g. KSB		g. Suguna
	h. Sharp		h. KSB
	i. Mahindra		i. Sharp
	j. Decon		j. Mahindra
			k. Decon
26	LIGHTERNING ARRESTOR	27	TRANSFORMER
	a. Pactil		a. Pactil
	b. Heco		b. Emco
	c. Atlas		c. Crompton
	d. G.K. Electricals		d. Kirloskar
			e. GEC
			f. Tesla
			g. Voltamp
			h. BHEL
			i. Areva
28	A.B. SWITCH & D.O. FUSE	29	SELECTOR SWITCH
	a. Pactil		a. Kaycee
	b. Jenco		b. Siemens
	c. Crompton		c. C & S
	d. Atlas		d. AE
			e. L&T
30	INDICATING LAMPS	31	CONTACTORS
	a. Vaishno		a. Siemens
	b. Essen		b. L & T



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	c. Philips		c. ABB
	d. L&T		d. Schnieder-mj
	e. GE		
32	MEASURING INSTRUMENTS	33	PF IMPROVEMENT CAPACITOR & APFC PANEL
	a. AMP		a. EPCOS
	b. Meco		b. Neptune
	c. AE		c. L & T
	d. Enercon		d. Crompton
	e. PROK-DV's		e. Havells
	f. L&T		
34	RELAY FOR AUTOMATIC PF IMPROVEMENT	35	CURRENT TRANSFORMER
	a. EPCOS		a. AE
	b. Conzerve		b. Rishabh
	c. L & T		c. Kappa
	d. Havells		d. L&T
36	DATA CABLES & FACTORY MADE PATCH CHORDS	37	INFORMATION OUTLET / RJ 45 CONNECTORS / RJ – 11 SOCKETS
	a. Legrand		a. D -Link
	b. D- Link		b. Legrand
	c. Finolex		c. Molex
	d. Molex		d. Systemax
	e. AMP		e. AMP
	f. KEI		
	g. Poly cab		
38	TELEPHONE WIRES	39	RG 6 CABLE FOR TV
	a. Finolex		a. Finolex
	b. Delton		b. Delton
	c. Havells		c. National
	d. RR KABEL		d. KEI
	e. KEI		e. Poly cab
	f. Poly cab		
	g. Rallison		
40	JACK PANEL	41	RACK
	a. D- Link		a. Valrack
	b. Legrand		b. Digitron
	c. Molex		c. HCL
	d. Systemax		d. A Link
	e. Valrack		e. D-Link
	f. AMP		
42	FIRE ALARM PANEL	43	SMOKE / HEAT DETECTOR
	a. Honey well / System sensor		a. Apollo
	b. Notifier		b. Morley ias
	c. Mircom/ Secutron		c. Edward
	d. Morley ias		d. System sensor / Honey well
	e. Ravel		e. Mircom/secutron



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	f. Agni		f. Notifier
			g. Ravel
			h. Agni
44	MANUAL CALL POINT / HOOTER/ RESPONSE INDICATOR		
	a. Honey well /System sensor		
	b. Notifier		
	c. Simplex		
	d. Mircom/ Secutron		
	e . Morley ias		
	f. Ravel		
	g. Agni		

**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 Chief Engineer of LIC 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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## APPENDIX TO CONDITIONS OF CONTRACT

**SUB: E-TENDER FOR PROPOSED ADDITIONAL & ALTERATION WORK INCLUDING ELECTRICAL WORKS FOR FLAT NO.14A AT QUEENS MANSION BUILDING, PARK STREET, KOLKATA, WEST BENGAL.**

**ESTIMATED COST : Rs 29,92,882.00**  
**PERIOD FOR COMPLETION : 45 (Forty Five) Days**  
**EARNEST MONEY DEPOSIT : Rs. 59,900.00 (To be submitted in stipulated form)**

Sl. No.	Description	Remarks
1	Validity of Tender	The tender should remain valid up-to three months from the last date of submission of tender for acceptance.
2	Date of commencement	Either 10 (ten) days from the date of acceptance letter issued to the contractor  <b>OR</b> The day on which contractor is instructed to take possession of the site, whichever is <b>earlier</b>
3	Date of completion	<b>45 (Forty Five) days</b> from the date of commencement
4	Liquidated damages for delay	Compensation in the form of Penalty for delay of work @ 0.5% of contract sum per week of delay subject to maximum 10% contract sum.
5	Period of final measurement	<b>60 (Sixty) days</b> from the date of completion of contract
6	Interim certificate	<b>Rs. 20.00 Lac</b> per month or as per decision of competent authority
7	Period of honouring interim certificate	<b>20 (Twenty) days</b>
8	Period of honouring final certificate	<b>90 days</b> from the date of submission of final bill with details.
9	Security Deposit	<b>@5% of accepted tender amount.</b>
10	Recovery of Security Deposit	In case of Cash option, the Security Deposit shall be recovered from R.A. Bills at 7.5% of Gross amount of bill <b>till the sum along with sum already deposited as EMD equals the total security deposit. In Bank Guarantee Option- Please see clause no. 35.1</b>
11	Defect Liability Period	12 months from the date of virtual completion of the work
12	Contractor's All Risk Policy inclusive of Third Party Liability	CAR policy should be contract value inclusive of 7.5 % of Contract value of third party liabilities.
13	Workmen's Compensation Policy	As per requirement of prevalent Laws & Mutual Agreement. <b>Penalty of not taking timely extension of expire policies for CAR &amp; WMC:</b> The date of submitting the renewed Insurance policy, if any will be 15 working days prior to the last date of expiry of the existing policy, failing which LIC may insure/renew insurance and apply penal cost on the contractor i.e. Premium Charges plus Rs.10000/- as admin charges and Rs.25000.00/- as penalty.



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Sl. No.	Description	Remarks
14	Interest on Lump sum Advance	10% simple interest p.a.
15	No Claim Certificate	To be given on Contractors letter head

<p><b>NO CLAIM CERTIFICATE CUM RECEIPT</b>                  (To be given on Contractor's letterhead)</p> <p>"Received Rupees _____ (Rupees _____) being the amount against my/our final bill dated _____ for _____ (Name of Work) in full and final settlement of bill.</p> <p style="text-align: right;">Contractor                  (Signature of Contractor on Revenue stamp)</p> <p style="text-align: right;">Rubber stamp/seal of the contractor /company</p>
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**NOTE:**

- The GST on works contract shall be paid by the Corporation over and above the value of work done, at the applicable rates during the contract period.
- Labour cess:** Rates are inclusive of Labour cess and labour cess will be deducted from contractor's bill.
- Water charges, Electricity charges, penalty on account of non renewal of Insurance, liquidated Damages if imposed will attract GST at applicable rates during contract period.
- TDS on GST would be deducted as per prevailing rules.

**APPENDIX TO GENERAL INSTRUCTION TO CONTRACTOR**

SI.NO	Clause Nos.	Description	Remarks
1.	12	Recovery of Electricity charges from Contractors bill <b>if used from LIC source</b>	0.25% of the Gross value of work done.
2.	13	Recovery of Water charges from Contractors bill <b>if used from LIC source</b>	0.25% of the Gross value of work done.



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## **FORFEITURE OF EARNEST MONEY DEPOSIT.**

### **Forfeiture of EMD**

A bidder's bid security will be forfeited if the bidder:

- i) withdraws or amends its/ his tender;
- ii) impairs or derogates from the tender in any respect within the period of validity of the tender;
- iii) If the successful bidder fails to sign the contract or furnish the required performance security within the specified period.

### **Punitive Provisions**

Without prejudice to and in addition to the rights of the procuring entity to other penal provisions as per the bid documents or contract, if the procuring entity comes to a conclusion that a (prospective) bidder/ contractor directly or through an agent, has violated this code of integrity in competing for the contract or in executing a contract, the procuring entity may take appropriate measures including one or more of the following:

#### **i) If his bids are under consideration in any procurement:**

- a) Forfeiture or encashment of bid security;
- b) Calling off of any pre-contract negotiations; and
- c) Rejection and exclusion of the bidder from the procurement process.

#### **ii) If a contract has already been awarded:**

- a) Cancellation of the relevant contract and recovery of compensation for loss incurred by the procuring entity;
- b) Forfeiture or encashment of any other security or bond relating to the procurement;
- c) Recovery of payments including advance payments, if any, made by the procuring entity along with interest thereon at the prevailing rate.

#### **iii) Provisions in addition to above:**

- a) Removal from the list of enlisted contractors and banning/debarment of the bidder from participation in future procurements of the procuring entity for a period not less than one year;
- b) In case of anti-competitive practices, information for further processing may be filed under a signature of the Joint Secretary level officer, with the Competition Commission of India;
- c) Initiation of suitable disciplinary or criminal proceedings against any individual or staff found responsible.



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**BANK ACCOUNT AND OTHER DETAILS:**

ANNEXURE

**To be submitted along with Tender copy**

Sl. No	Description	Details
01	Name of the Company/Firm/Entrepreneur Institute, etc	
02	Address	
	Phone Number	Mobile: Land Line:
	E-Mail ID	
03	Bank Account Details:	
A.	Name of the Bank	
B.	Address of the Bank Branch	
C.	Account No	
D.	Type of Account	
E.	IFSC/RTGS Code	
	(Enclose Xerox copy of the Cheque leaf)	
04	PAN No *	
05	TIN Registration No.*	
06	GST IN Registration No.*	

I declare that, the above furnished information is correct. During the contract period, if any changes took place in the above said information, the same will be informed with the valid reasons.

SIGNATURE

CONTRACTOR

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CHIEF ENGINEER