



LIFE INSURANCE CORPORATION OF INDIA
ENGINEERING DEPARTMENT
NORTHERN ZONAL OFFICE
“JEEVAN PRAKASH”
25, K.G. MARG
NEW DELHI-110001
PHONE: 011-28844180
e-mail: nz_engg@licindia.com

BID-III

FINANCIAL BID & SCHEDULE OF QUANTITIES

**E-TENDER FOR REPLACEMENT OF AHUs INSTALLED AT
JEEVAN BHARTI BUILDING, NEW DELHI.**

CONTENTS

S. No	DESCRIPTION	Page	
		From	To
1	Letter to Contractor from Chief Engineer	2	3
2	Letter from Contractor to Chief Engineer	4	5
3	Appendix to Conditions of Contract	6	7
4	Appendix to Special Conditions	8	8
5	Conditions of contracts	9	29
6	General Instructions to Contractors	30	36
7	Proforma for Articles of Agreement-Annexure-A	37	38
8	Form of Bank Guarantee in lieu of Security Deposit in individual contract- Annexure-B	39	41
9	Form of Bank Guarantee for Performance Guarantee-Annexure-C	42	44
10	Form of Bank Guarantee to secure a lump sum advance-Annexure-D	45	47
11	Form of Bank Guarantee in lieu Earnest Money Deposit – Annexure-E	48	49
12	Technical Specifications for HVAC Work	50	94
14	List of Principal Makes/Brands of various materials	95	96
15	Special Conditions of Contract	97	105
16	Certified	106	106
17	Schedule of Quantities	107	113

LETTER TO CONTRACTOR FROM CHIEF ENGINEER

Date: 20.10.2019

To,

Dear Sir / Sirs,

SUB: E-TENDER FOR REPLACEMENT OF AHUs INSTALLED AT JEEVAN BHARATI BUILDING, NEW DELHI

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

- (a) BID I : E.M.D. & TENDER FEE
- (b) BID II : PREQUALIFYING BID
- (c) BID II : FINANCIAL BID & SCHEDULE OF QUANTITIES

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 details for the work will be available for inspection at the following Office:

- (a) Chief Engineer, Northern Zonal Office. Life Insurance Corporation of India, Jeevan Prakash Building (2nd Floor), 25 K.G. Marg, New Delhi - 1100 01

3) The bidders should submit required Earnest Money Deposit (EMD) as mentioned in e-Tender in a Physical Envelope accompanied by **Earnest Money Deposit Instrument of Rs.3,85,000.00 (Rupees Three lakhs eighty five thousand only)** in the form Bank Guarantee / crossed demand draft on a Nationalized Bank/NEFT in favour of "Life Insurance Corporation of India" payable at **New Delhi**, which shall be received at the office of Chief Engineer at above address **on or before As per the Key Dates**. EMD can be deposited through on line mode of payment i.e. NEFT / RTGS etc in the bank account as per details provided in tender documents 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**



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

not accept any offer after that. So, the tenderer are advised to do their process well before the due date and time to avoid any such instances. The bidders should submit required Tender Cost as mentioned in e Tender in a sealed Envelope **of Rs. 2000.00 + Rs. 360.00 (GST) = Rs.2,360.00 (Rupees Two Thousand three hundred and sixty only)** in the form of crossed demand draft/ pay order on a Nationalized Bank in favour of "**Life Insurance Corporation of India**" payable at new Delhi, which shall be received at the office of Chief Engineer at above address **on or before As per the Key Dates**. The payment can be made through on line mode of payment i.e. NEFT RTGS also.

- 4) An annexure for Guidelines to Submit tenders on Electronic Tendering System is attached in the Tender document. The tenderer are advised to carefully read the above document for understanding of e-Tendering System. The above Annexure will supersede 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.

Encl: As above.

CHIEF ENGINEER



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

LIFE INSURANCE CORPORATION OF INDIA

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
Northern Zonal Office
Jeevan Prakash (2nd Floor),
25 K.G. Marg,
New Delhi - 1100 01

SUB: E-TENDER FOR REPLACEMENT OF AHUs INSTALLED AT JEEVAN BHARATI BUILDING, NEW DELHI

Dear Sir,

1) Having examined the Enrolment Form, Selection Criteria , Technical Specifications, Schedule of Quantities, Detailed Drawings, Specifications, Conditions of Contract etc. included in the tender document for the Item 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 Item 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.3,85,000.00 (Rupees Three lakhs eighty five thousand only)** in the form of Bank Guarantee of Nationalized/ scheduled Bank/ **CROSSED DEMAND DRAFT OF THE**



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

NATIONALISED/ SCHEDULED BANK PAYABLE AT New Delhi / NEFT / RTGS UTR No

..... 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

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 Security Deposit amounting to Rs. _____ (Rupees _____ only) or two like amounts in the form of Bank Guarantee/s from any Nationalized/Scheduled Bank located at _____ as per specimen given in Annexure "B" to Conditions of Contract, within 21 (Twenty One) days from the date of issuance of acceptance of tender or within 21(Twenty One) days from the extended date as may be extended by the Chief Engineer.

4) I/We, agree to furnish a lump sum Performance Guarantee amounting to Rs. _____ (Rs. _____ Only) in the form of Bank Guarantee from any Nationalized/Scheduled Bank located at _____ as per specimen given in Annexure "C" to Conditions of Contract, within 10 (ten) days from the date of issuance of acceptance of tender.

5) I/We, note that the Earnest Money Deposit of **Rs.3,85,000.00 (Rupees Three lakhs eighty five thousand only)** would be refunded to me/us.

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

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

6) 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 Performance Guarantee is not submitted within the prescribed period or approved extended period, 50% of the EMD will be forfeited automatically without any notice.

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)

APPENDIX TO CONDITIONS OF CONTRACT

E-TENDER FOR REPLACEMENT OF AHU's INSTALLED AT JEEVAN BHARTI BUILDING, NEW DELHI.

ESTIMATED COST : Rs.256.69 Lakhs
 PERIOD FOR COMPLETION : 4 (Four) Months
 EARNEST MONEY DEPOSIT : Rs.3,85,000.00 (To be submitted in DD/ BG/ ONLINE/NEFT)

S. No.	Clause Nos.	Description	Remarks
1	11	Minimum requirement of Technical staff ; Recovery for Non employment	Site Engineer Rs. 40,000/- per month Site Supervisor (2 no.) Rs. 15,000/- per month per supervisor.
2	13	Date of commencement	1. Either 21 (twenty one) days from the date of acceptance letter issued to the contractor OR The day on which contractor is instructed to take possession of the site, whichever is earlier
3	13 & 26	Date of completion	4 (Four) months from the date of commencement
4	19	Liquidated damages	Compensation in the form of penalty for delay of the work: Quantum of compensation: 1.5% per month of delay to be computed on per day basis as mentioned in Clause 19.1, not to exceed 10% of the tendered value of work.
5	21	Period of final measurement	60 (Sixty) days from the date of completion of contract
6	22	Interim certificate	Rs.64.00 Lakhs
7	22	Period of honoring interim certificate	20 (Twenty) days
8	22	Period of honoring final certificate	90 days

S. No.	Clause Nos.	Description	Remarks
9	35	Security Deposit and Performance Guarantee	Security Deposit will be Rs.6,41,800.00 (Rupees Six lakh forty one thousand and eight hundred only) and Performance Guarantee will be Rs.12,83,500.00 (Rupees Twelve lakh eighty three thousand five hundred only) Performance Guarantee under shall be only in the form of Bank Guarantee valid up to scheduled date of completion.
10	35	Recovery of Security Deposit	Security Deposit shall be recovered from R.A. Bills at 7.5% of Gross amount of bill till the sum along with sum already deposited as EMD equals the Total Security Deposit, in case of Cash Option.
11	37	Interest on Lump sum Advance	9% simple interest p.a.
12	17.5	Contractor's All Risk Policy inclusive of Third Party Liability	Contractor's All Risk Policy will be for total contract value and third Party Liability @ 5 % of contract value. The date for submitting the renewed insurance policy, if any, will be 15 days prior to the last date of expiry of the existing policy, failing which LIC may insure/ renew insurance and apply penal cost on contractor i.e. Premium Charges + Rs.10000/- as penalty.
13	17.6	Workman's Compensation Policy	As per mutual Agreement.
14.	22.6	No Claim Certificate	To be given on Contractors letter head

NO CLAIM CERTIFICATE CUM RECEIPT

"Received Rupees _____ (Rupees _____)
being the amount against my/our final bill dated _____ for _____ (Name of Work) in full and final settlement of bill.

I/We have no further claim for any amount on above work.

Contractor
(Signature of Contractor on Revenue stamp)

Rubber stamp/seal of the contractor /company

APPENDIX TO SPECIAL CONDITIONS

Sl.NO	Clause Nos.	Description	Remarks
1.	12 & 13	Recovery of Electricity and / or Water charges from Contractors bill	0.50% (0.25% against water charges & 0.25% against electricity charges) of the Gross value of work done.

Note: **TAXES, DUTIES, LEVIES AND DEDUCTION AT SOURCE:**

- Corporation shall pay GST on works contract at the applicable rates during the currency of the contract.

Deduction at source of Income Tax, Labour cess etc. shall be made by LIC of India as per the provisions prevailing from time to time from the Running Account or Final Bill/s and remitted to the concerned statutory Authorities as per rules.

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, 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.
- 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

Executive Director
(Engineering)
Zonal Manager

ABBREVIATIONS

E.D.(E)
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.

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
- 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.

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, license 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 neighboring 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.
- 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 correctness 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 Corporation's Engineer and to ensure that such materials are on site well ahead of 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.

- 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 authorised 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 LAKH :

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

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

A qualified resident Engineer having a Recognized 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 CIVIL WORKS COSTING MORE THAN Rs.200 LAKH:

i) A qualified resident Engineer having a Recognized 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 HVAC, HT and Interiors etc.

e. RECOVERY FOR NON DEPLOYMENT OF ENGINEER/S AT THE SITE

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.

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**. 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.
 - 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-efficients 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 and above the basic rate of material (without GST) T &P, water charges and labour to cover all supervision, overheads, profits and all other applicable taxes/cess. GST on works contract shall 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.
- 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.

- 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.

RECOVERY FOR NON EXTENSION OF INSURANCE POLICIES (WORKMEN'S COMPENSATION AND CONTRACTOR'S ALL RISK POLICY INCLUSIVE OF THIRD PARTY LIABILITY)

- 17.9** The date for 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, Premiums Charges + Rs. 10,000/- as penalty.

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.

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 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. DAMAGE FOR NON-COMPLETION & REWARD FOR EARLY COMPLETION:

19.1 If the Contractor fails to complete the work by the date of completion stated in the "Appendix to Condition of Contract" or within time properly extended under Clause (18) hereof and the CE certifies in writing that in his opinion the same ought, reasonably so, to have been completed, the Contractor shall pay or allow the Employer the sum named in the Appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete and the Employer may deduct such damages from any money due to the Contractor. In case liquidated damages in accordance with the above provision accrue to maximum limit as mentioned in the Appendix to the Conditions of the Contract, the Chief Engineer shall be at liberty to rescind the Contract and to get it completed entirely at the risk and cost of the Contractor through any other agency he decides to appoint. All extra expenses incurred shall be recoverable from the money due to Contractor or lying to his credit with the Employer against the present or any other Contract.

~~**19.2** If the Contractor completes the work in advance before the stipulated period stated in the "Appendix to Condition of Contract" in all respects and the Chief Engineer certifies in writing that in his opinion the same has been completed, the reward for early completion is applicable and payable to the contractor. If contractor completes the works 3 months in advance in all respects, 0.5% of final contract completion value shall be rewarded. If contractor completes the works less than 3 months in advance, 0.1% of the final contract completion value shall be rewarded. The amount, if payable, shall be paid along with final bill.~~

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 MEASUREMENT OF WORK:

21.1 All items having a financial value shall be entered by the Corporation Site Engineers or by an Engineer authorized for the purpose, in the Measurement Book (MB). All measurements and levels shall be taken jointly by the Site Engineer or his authorized representative and by the Contractor or his authorized representative from time to time 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 Engineer whose decision in the matter shall be final and binding..

21.2 If the contractor or his authorized representative does not attend for joint measurements periodically for the completed works ,then the site engineer shall take measurements after giving notice in writing of at least 3 (three) days. Measurement 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 date of measurement then, such measurements recorded in his absence by the Site Engineer shall be deemed to be accepted by and binding on the Contractor.

- 21.3** The Contractor shall, without any extra charge provide all assistance with every appliance, labour and other things necessary for taking measurements and recording levels including test checking of such measurements by any person authorised by the Employer.
- 21.4** 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.
- 21.5** 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.
- 21.6** 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 Site Engineer or his authorized representative and the Contractor's Site Engineer, 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 authorized 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 instalment under Interim Certificate to be issued by the Corporation's Engineer to the Contractor on account of the work executed, as mentioned in the Appendix to the Conditions of Contract however subject to recoveries under this Contract. The Interim Certificate shall be based upon Interim Bills or Running Account Bills to be prepared by the Contractor and supported by the detailed measurements. Adequate references, sketches and cross references wherever necessary are also to be provided with detailed measurements. The Corporation's Engineer may allow inclusion in the Interim Certificate such amount as he may consider proper on account of materials delivered upon the site by the Contractor for use in the work but not incorporated in it.
- 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 in itself be conclusive evidence that any work or materials to which it is 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 with held 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 honouring final certificate till the date of payment.

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

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; which ever 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, 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.

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 Corporation's Engineer 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 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 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 fulfil 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 authorised 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
- 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 realised. 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 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.

35. SECURITY DEPOSIT AND PERFORMANCE GUARANTEE AND EMD:

- 35.1** Amount towards Security deposit shall be calculated as per details given under Serial No.10 of "APPENDIX TO CONDITIONS OF CONTRACT" in Part - II of 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 deductions 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.

Amount towards Earnest Money deposit (EMD) shall be deposited as per details given in "APPENDIX TO CONDITIONS OF CONTRACT" in Part - II of the tender. If the lowest tenderer withdraws his tender before the expiry of validity period or before the issue of letter of Acceptance, whichever is earlier, or makes any modification in the terms and conditions of the tender which are not acceptable to the department, then the EMD shall be forfeited as stipulated in the "APPENDIX TO CONDITIONS OF CONTRACT".

- 35.2** Performance Guarantee under "Appendix to Conditions of Contract" shall be only in the form of Bank Guarantee valid up to scheduled date of completion.
- 35.3** **The Bank Guarantee/s shall be from Scheduled commercial bank only (i.e. Indian or foreign banks included in second schedule of Reserve bank of India Act 1934 excluding Co-operative banks or Regional Rural banks) and not from Scheduled Co-operative banks. In case the BG submitted by the contractor is not genuine, the contractor will be barred from participating in the tender of the Corporation for 3-5 years and the information will be shared with other Government Organizations including Banks and other financial institutions and to their previous/present employers etc.**
- 35.4** Bank Guarantee/s (BGs) against Security Deposit (SD) and Performance Guarantee (PG) shall be executed as per the specimen pro-forma at Annexure B and C. The Bank Guarantee/s against Security Deposit (SD) shall be submitted within 21 (twenty one) days from the date of issuance of letter of acceptance or within 21 (twenty one) days from the extended date as may be extended by the Chief Engineer. The Bank Guarantee/s against Performance Guarantee (PG) shall be submitted within **21 (Twenty one) days** from the date of issuance of letter of acceptance.
- 35.5** In case of failure by the contractor to furnish the Bank Guarantee against Performance Guarantee as per Cl.35.2 by the stipulated date, Employer shall without prejudice to any other right or remedy available in law, be at liberty to cancel the tender which may entail forfeiture of the Earnest Money of contractor as stipulated in "Appendix to Conditions of Contract".
- 35.6** 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.
- 35.7** 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.
- 35.8** 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.
- 35.9** 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.

- 35.10** Bank Guarantees towards Performance Guarantees (where applicable) shall be released after the virtual completion is issued.
- 35.11** Contractor shall keep the Security Deposit and Performance Guarantee, 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 lying with them.
- 35.12** The Contractor should note that no interest will be allowed on any part of the Security deposit.
- 35.13** 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).
- 35.14** 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. However, where the contractor fails to furnish Bank Guarantee against Performance Guarantee the matter shall be dealt with as per Cl. 35.5 above.
- 35.15** 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** All disputes and differences of any kind whatsoever arising out of or in connection with the Contract to the carrying out of the work (whether during the progress of the work or after its completion and whether before or after determination, abandonment or breach of the Contract) shall be referred by to the Chief Engineer within 15 (fifteen) working days of any such matter arising.

The Chief Engineer shall upon receipt of such reference/s will arrange to enter all such disputes(s) on the date of actual receipt in his office in a register and serially numbered. The receipt of such reference shall be acknowledged by the Office of the Chief engineer. However mere acknowledgment of receipt of claim does not entail that the claim is admitted or accepted.

The Chief Engineer shall thereafter constitute a three member committee comprising of Officers not below the rank of Executive Engineer / ADM within 15 working days of reference made by the contractor and delivered at Chief Engineer's Office to examine the dispute and submits its report with documentary evidence to Chief Engineer within 45 days of reference made. The Chief Engineer shall give his decision within 60 days from the date of reference after hearing the Committee and the Contractor.

If the Contractor be dissatisfied with the decision of the Chief Engineer, other than EXCEPTED MATTERS, then and in any such case, the Contractor shall refer the matter to Executive Director (Engineering), who in turn after hearing Chief Engineer and Contractor shall give his decision in writing within 30 (Thirty) working days from the day the referred matter is received in his Office.

If the Contractor still be dissatisfied with the decision of the Executive Director (Engineering), then and in any such case, the contractor shall within 30 (Thirty) working days after receiving notice of such decision, give a written notice to the Executive Director (Engineering) requiring that such matters in dispute (other than the EXCEPTED

- MATTERS) be arbitrated upon. In case the contractor fails to serve the written notice on any or all the issues in dispute within the aforesaid time period, the decision conveyed by the Executive Director (Engineering) shall be taken as final, binding and conclusive and shall not be open to arbitration.
- 36.2** Any disputes or differences that the employer may have with the contractor shall also be referred to Arbitration.
- 36.3** All disputes between the parties to the contract (other than those for which the decision of the CE or any other person is by the contract expressed to be final & binding) shall after written notice by either party to the contract to the other of them be referred to sole arbitration by an Arbitrator to be appointed by the Executive Director (Engineering), which shall be final and binding.
- 36.4** If the arbitrator so appointed resigns his appointment or vacates his office or is unable or unwilling to act due to any reason whatsoever, the appointing authority shall appoint a new arbitrator in his place.
- 36.5** The Sole Arbitrator shall determine all matters in disputes other than EXCEPTED MATTERS (referred in Cl.No.34) which shall be referred to the Sole Arbitrator.
- 36.6** The references to arbitration by contractor on the matter of withholding by the Employer the certificate for interim payment can take place during the currency of the contract. However, on other kinds of disputes, unless both the parties agree in writing, reference of such disputes to arbitration shall not take place until after the completion or alleged completion of the work or termination or determination of contract.
- 36.7** It is a term of the contract that the person invoking Arbitration shall state the facts supporting his claim, the points at issue and the relief or remedy sought.
- 36.8** It is also a term of the contract that if the contractor does not make any demand for arbitration in respect of any claims within 120 days of receiving the intimation from the Corporation that the final bill is ready for payment, the claims if any received after 90 days period shall be absolutely barred from reference to the Arbitrator.
- 36.9** The Arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act 1996 or any statutory modifications or Amendment to it from time to time.
- 36.10** In all cases Arbitration shall give separate award for each dispute or difference referred to him. The Arbitration shall decide each dispute in accordance with term of the contract and give a reasoned award. The venue of arbitration shall be in accordance with Arbitration Act. However, it may preferably be at L.I.C. of India, Zonal Centre or Place of Work Site.
- 36.11** The work under contract shall continue during the Arbitration proceedings and no payment due or payable to the contractor shall be withheld on account of such proceedings.
- 36.12** The Arbitration is deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims.
- 36.13** Any fees payment/ reimbursements payable to the Arbitrator shall be shared equally by both the parties.
- 36.14** The Contractor hereby also agrees that Arbitration under this Clause shall be a condition precedent to any right of action in Law Courts under the Contract.

37. LUMP SUM ADVANCE (APPLICABLE TO CONTRACT COSTING Rs.25 LAKHS AND ABOVE)

- 37.1** Loan will be available if required by the Contractor, and may be given as under on submission of application by him subject to other conditions being fulfilled.
- 37.2** A lump sum amount not exceeding 10% in two installments (5% + 5%) of the Contract accepted amount may be advanced against a Bank Guarantee and at the interest rate as specified in Appendix to the Conditions of Contract. The advance shall be utilized by the Contractor for the purpose of this Contract only and for no other purpose.
- 37.3** The Bank Guarantee (Proforma at Annexure 'C') shall be for the equivalent amount of loan 'plus' simple interest at specified rate plus 1% of loan amount to cover costs. The Bank Guarantee shall be from any Nationalized or Scheduled Bank preferably located at Zonal Head Quarters of LIC or place of work and shall be valid till the date of completion as specified in Appendix to Conditions of Contract.
- 37.4** The amount of loan can be sanctioned to the Contractor on specific request as per terms of the contract and will be limited to 10% in two installments (5% + 5%) of the Contract accepted amount.
- 37.5** Recovery of the sums advanced by way of loan as above and of interest, thereon shall be made by deduction from the Contractor's running account bills in suitable percentages in relation to the progress of work after, 10% of the work is completed, subject to the condition that entire amount of loan with interest thereon shall be fully recovered by the time the work amounting to 80% of the Contract sum is completed. Provided that if at any time the Contractor fails to execute the Contract to the satisfaction of the Employer for any reason whatsoever, the Employer shall be entitled to recall forthwith the entire amount so advanced with interest, cost and legal expenses, etc. and/or recover the whole/balance amount as the case may be, from the bill if any, payable to the Contractor or by enforcing the Bank Guarantee.
- 37.6** Whenever extension of time is granted to the Contractors for the completion of the project and where the loan is not fully recovered, Contractor shall furnish fresh Bank Guarantee for extended period of Contract for the outstanding loan amount together with specified simple interest for the remaining period and 1% of outstanding loan amount towards costs.
- 37.7** Whenever the full amount of loan plus interest has been fully recovered, the Bank Guarantee shall be released.
- 37.8** If the situation so warrants a second loan will be available if required by the contractor subject to the following conditions :
- a) At least 50% of the first loan stands recovered
 - b) The amount of the loan shall not exceed 5% of the balance amount of work.
 - c) The sum of amount outstanding plus amount of second loan shall not exceed 5% of the total value of work.
- 37.9** All other conditions applicable to lump-sum advance shall apply for the Second loan also.

GENERAL INSTRUCTIONS TO CONTRACTORS

1. DRAWINGS:

- 1.1 Site shall be made available 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 shall have to be worked out by the contractor.

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.

4. TIME AND PROGRESS CHART:

- 4.1 The contractor shall prepare and submit a master programme in the form of Time and Progress Chart of all activities required to be executed for completion of the work in all respects within 15 (fifteen) days of the communication of acceptance of the tender, to the Corporation's Engineer. The Time and Progress chart shall be fitted within the specified overall period of completion (as stated in Appendix to Conditions of Contract). If the Contractor does not submit the Time and Progress Chart, the employer may be at liberty to prepare the Time & Progress Chart which shall be accepted in full in letter and spirit to maintain the pace of the progress of the work.

In addition to the above if the Contract Sum is Rs. 15 crore and above, the contractor has to submit monthly progress report of the work in a computerized form to the Corporation's Engineer. This progress report should contain the following:-

- (a) Construction Schedule of the various components of the work through a bar chart for the next three months period.
- (b) Progress Chart of various components of the work which are planned and achieved for the preceding 3 months and reasons for deviation if any should be mentioned.
- (c) Details of the technical persons available at the site along with their designation.

- (d) Targeted figure for financial achievement vis-à-vis planned and mentioning the broad details of all the Running Account Payment received.
 - (e) A statement showing the extra/ substituted/ deviated items submitted by the contractor and the items pending for sanction/ decision by the department.
 - (f) Quality assurance and quality control test conducted during the month with the results thereof.
 - (g) Details of hindrances if any.
- 4.2 Ancillary work should be so started that all such work is completed before the specified overall contractual period of completion.
- 4.3 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.

5. BENCHES:

- 5.1 The Contractor is to construct and maintain proper benches to indicate the intersection 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.

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** Contractor should note that unless otherwise stated the tender is strictly on **ITEM** Rate basis and his attention is drawn to the fact that his quoted item rates should be correct, workable and, self supporting.

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.

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.

14. OFFICE FOR CORPORATION'S ENGINEER ON SITE:

- 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.
- 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.

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, levels, 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.

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 Mistries 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:

- 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.
- 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 reimbursed 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 etc. shall be made by LIC of India as per the provisions prevailing from time to time from the Running Account or Final Bill/s and remitted to the concerned statutory Authorities/State Government on behalf of the Contractor.

33. PRICE FLUCTUATION/VARIATION:

Rates quoted by the Contractor shall be firm throughout the currency of the contract (including extension of time if any granted). No price fluctuation, due to variation for any other reason whatsoever, shall be allowed.

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 Northern Zonal Office at Jeevan Prakash Building (2nd Floor), 25, K.G. Marg, New Delhi - 110001 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 **New Delhi** and only the Courts in **New Delhi** shall have jurisdiction to determine the same.

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 initialled by the contractor and

..... Engineer, Zone, Life Insurance Corporation of India The said officer is hereby authorised to sign and initial on the Employer's behalf, the documents forming part of this contract.

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

Signature :
Name :
Address :

CHIEF ENGINEER
FOR AND ON BEHALF OF THE
LIFE INSURANCE CORPORATION
OF INDIA
Date :

2. Signature :
Name :
Address :

In the presence of

1. Signature :
Name :
Address :

FOR AND ON BEHALF OF THE
CONTRACTOR
M/S
Date :

2. Signature :
Name :
Address :



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

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.

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



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

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:

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 _____



Chief Engineer's Office, New Delhi AHU Replacement, Jeevan Bharti Bldg.
carrying on business in partnership under the name and style of _____
_____ (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.**

**ANNEXURE – 'C'****LIFE INSURANCE CORPORATION OF INDIA**
(Refer Clause No. 35 of Conditions of Contract)**FORM OF BANK GUARANTEE FOR PERFORMANCE GUARANTEE 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 _____** 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.

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



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

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:

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 _____



Chief Engineer's Office, New Delhi AHU Replacement, Jeevan Bharti Bldg.
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.**



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

ANNEXURE – 'D'

LIFE INSURANCE CORPORATION OF INDIA

(Refer clause 37 of Conditions of Contract)

FORM OF BANK GUARANTEE TO SECURE A LUMP SUM ADVANCE

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 the 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 make at the request of the contractor a lump sum
advance of Rs. _____ for utilizing it for the purpose of contract on his furnishing
a guarantee acceptable to the Corporation, we the _____ ** Bank (hereinafter
referred to as 'the said Bank') a company under the companies Act, 1956 and having our
registered office at _____ do hereby guarantee the due recovery by the Corporation
of the said advance together with interest and costs thereon according to the terms and
conditions of the said contract. If the said contractor fails to utilize the said advance for the
purpose of the contract and/or the said advance together with interest thereon as aforesaid is
not fully recovered by the Corporation, we the said Bank hereby unconditionally and
irrevocably undertake to pay to the Corporation on demand and without demur to the extent of
the sum of Rs. _____.

1. We, the said Bank further agree that the Corporation shall be the sole judge of and as
to whether the said contractor has not utilized the said advance or any part thereof for the
purpose of the said contract and the extent of loss or damage caused to or suffered by The
Corporation on account of the said advance together with interest and costs thereon not being
recovered in full and the decision of the Corporation in this respect, shall be final and binding
on us.

2. The Corporation shall have the fullest liberty without affecting in anyway 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 the advance 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 the advance 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 such liability.

Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

3. It shall not be necessary for the Corporation to proceed against the contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the 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.

4. Notwithstanding anything to the contrary hereinbefore contained the Bank's liability hereunder shall not exceed Rs. _____ (Rupees _____) in the aggregate. This Guarantee shall remain in force till the _____ day of the year 20...and the Bank's liability hereunder will cease to be operative unless any claim is lodged with the Bank within 6 (six) months thereafter.

5. We, the said Bank lastly undertake not to revoke this Guarantee 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

LIFE INSURANCE CORPORATION OF INDIA

(Name and Designation)

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 _____
_____ (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)



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

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.



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

ANNEXURE – 'E'

FORM OF BANK GUARANTEE IN LIEU OF EARNEST MONEY DEPOSIT

(Refer clause 10 of Instructions in regard to Submission of Tenders in Part -II)

(On Non-Judicial Stamp Paper to be stamped in accordance with stamp act, the stamp paper to be the name Executing Bank)

Ref:

Date:

Bank Guarantee No.....

To

THE LIFE INSURANCE CORPORATION OF INDIA

Dear Sir,

In consideration of Life Insurance Corporation of India having its Zonal Office at New Delhi in state of Delhi (Herein after called the "the Corporation" which expression shall unless repugnant to be the subject or context include its successors and assigns) having issued Tender Notice for the work of

M/s.....Having its Registered / Head Office at(Herein after called the "Tenderer" who wishes to participate in the said tender for

And you, have agreed to accept an irrevocable and unconditional Bank Bid Guarantee for the and amount of Rs..... (Rupees..... valid up to on behalf of the tenderer in lieu of Earnest Money Deposit required to be made by the tenderer, as a condition precedent for participation in said tender.

We, theBank incorporated underlaw and having one of our branches at and having our Registered Office/ Head office at do hereby unconditionally and irrevocable guarantee and undertake to pay to the "Employer" immediately on demand without any demur reservation, protest, contest and recourse to be extent of the said sum of Rs.....(Rupees only).

Any such claim/ demand made by the said "Employer" on us shall be conclusive and binding on us irrespective of any dispute or difference raised by the tenderer. This guarantee shall be irrevocable and shall remain valid up to If any further extension of this guarantee is required, the same shall be granted to such required period on receiving instructions from M/s to whose behalf this guarantee is issued.

We, the said Bank undertake not to revoke this guarantee during its currency except with the previous consent of the employer in writing and agree that any change in the constitution of the said tenderer or the said Bank shall not discharge our liability hereunder. In witness whereof the Bank, through its authorized officer, has set its hand and stamp on this day of 20 at



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

WITNESS

1. (SIGNATURE)
(NAME).....

(SIGNATURE)
(NAME).....
(Designation with Bank Stamp)

(OFFICIAL ADDRESS)
.....
.....

ATTORNEY AS PER
POWER OF ATTORNEY NO.....
DATE.....

2. (SIGNATURE)
(NAME).....

(OFFICIAL ADDRESS)
.....
.....

TECHNICAL SPECIFICATION FOR HVAC WORK

Section-1: AIR HANDLING UNITS

1 SCOPE:

The Scope of this section comprises dismantling & removing of existing AHU's and supply, erection, testing and commissioning of double skin Air Handling Units conforming to these Specifications and in accordance with requirements of drawings and schedule of quantities.

2 TYPE

The Air Handling Units shall be of floor mounted draw through type having sections such as filter section with pre-filters, microvee filters and HEPA filters as required under BOQ, cooling coil section with suitable chilled water cooling coil, fan section with DIDW fan, mixing section where required under BOQ, humidification section with centrifugal fan as per schedule of quantities and arrangement shown on the drawings.

3 CAPACITY

The air moving and coil capacities (Air Conditioning Load) shall be as shown in Schedule of equipment and quantities and on drawings.

4 CASING

The housing/ casing of the air handling unit shall be of double skin construction. The housing shall be so made that it can be delivered at site in total/ semi knock down conditions depending upon the conditions. The frame work shall be of extruded aluminium hollow sections fitted with pre-formed insulated sections. All the members shall be assembled thru mechanical joints to make a sturdy and strong frame work for various sections.

Double skin panels (each not exceeding 750mm wide) shall be made of 22G pre-coated Galvanized sheet steel and 22G galvanized sheet inside with pressure injected PU foam insulation of 25mm thick X 38 Kg/Cu. M in between. The panels shall be bolted from inside on to the frame work with soft rubber gasket in between to make the joints air tight.

Frame work for each section shall be bolted together with soft rubber gasket in between to make the joints air tight. Suitable doors with powder coated hinges and latches shall be provided for access to various panels for maintenance.

The fan and the motor arrangement shall be mounted on to the extruded aluminium frame work. The entire housing i.e. The Air Handling Unit shall be mounted on extruded aluminium base channel framework.

Drain pan shall be constructed of 16 SS sheet having 12 mm thick 32 Kq/Cu. XPE insulation. The pan shall have necessary slope to facilitate for fast removal of condensate.

5 MOTOR AND DRIVE

Fan motors shall be $230 \pm 10\%$ volts 50 cycles 3 phase totally enclosed fan cooled with IP-55 rotation. Motor shall be especially designed for quite operation and motor speed shall not exceed 1440 RPM. Drive to fan shall be provided through belt drive arrangement. Belts shall be of oil resistant type. Adjustable sheaves shall be provided.

6 FAN

The fan shall be forward, curved double inlet double width type complete with motor and drive package. The wheel and housing shall be fabricated from heavy gauge galvanized steel. The fan impeller shall be mounted on a solid shaft supported to housing with angle iron frame and pillow block heavy duty ball bearings. The fan shall be selected for a speed not exceeding 1000 RPM. The fan outlet velocity shall not be more than 1800 rpm. Fan housing with motor shall be mounted on a common steel base mounted inside the AHU on anti vibration springs or cushy foot mount. The fan shall be direct driven type. Another fire retardant canvass connection shall be provide at unit outlet to connect the ducts.

7. Cooling Coils:

The cooling coil shall be seamless copper tubes not less than 0.437 mm thick and 12.5 mm O.D. The coil shall have continuous aluminium fins. The tube shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tube. The coil shall be tested against leaks

At a hydraulic pressure of 21kg/m³ for a period of two hours. The water headers shall be of copper pipes to connect all the tubes. The header shall be complete with water In/Out connections, vent plug and drain at the bottom and designed to provide a water velocity between 0.6 to 1.8 m/s (2 to 6 FPS)

8. Filters:

As asked for under Bill of quantities.

9. Electrical Panel:

Each unit shall have its own electric panel consisting of MCCB / fuse switch unit, starter, VFD, indicating lamps ,incoming/outgoing internal and external wiring and earthing as per the details in BOQ.

10 Fresh Air Control:

An adjustable damper of GI sheet along with bird screen, air inlet louvers and air filters shall be provided for fresh air entry. The damper shall be sized for 50% of designed air quantity.

11 Limitations :

The air velocity across the cooling coils shall not exceed 500 fpm.

The fan outlet velocity shall not exceed 1800 fps (9m/s) in any case.

The velocity across the filters shall not exceed 500 fpm in any case.

Section-2: FAN COIL UNITS**1 General**

The fan coil units shall be ceiling mounting box type complete with finned coil, fan section with motor, insulated drain pans, cleanable air filters and fan speed regulator and other controls as described.

2 Cooling Coil

The coil shall be of seamless copper tubes not less than 5/8" O.D, 0.56 mm thick. The coil shall have aluminium fins. The fins shall be spaced by collars forming integral part of the fins. The tubes shall be staggered in the direction of air flow. The coil circuit should be sized for adequate water velocity but not exceeding 1.8 M/S (6 FPS) the fins shall be uniformly bonded to the tubes by mechanical expansion of the tubes.

The coils shall be tested against leaks at a hydraulic pressure of 10 kg/sq.cm. This pressure shall be maintained for a period of 24 hours. No drop should be observed indicating any leaks.

3 Fan

This shall consist of (2) two light weight aluminium impellers of forward curved type, both statically and dynamically balanced, along with properly designed G.I. sheet casings.

The two impellers shall be directly mounted on to a double shaft, single phase multiple winding motor capable of running at (3) three speeds.

A G.I. plenum shall connect the fan outlets to the coil.

4 Drain Pans

The drain pan shall be sandwich type fabricated out of deep drawn single piece stainless steel sheet, covering the whole of coil section and extended on one side for accommodating coil connection valve, etc. and complete with a 25mm drain connection. The drain pan shall be insulated with 12mm XPE insulation.

5 Air Filter

The filter shall be cleanable type 15mm thick with 90% efficiency down to 20 micron of rubberized coir to be mounted behind the return air grille in the unit casing.

6 **Speed Control**

A sturdy switch shall be provided with the unit complete with wiring, for off and with minimum (3) three speed control, of the fan.

7 **Automatic Controls**

Each unit shall have a room type thermostat and a 3 way motorized modulating water valve. The valve shall be fixed at a convenient location. The thermostat shall be mounted along with the speed control switch on a common plate. The plate shall clearly indicate the fan positions.

The water valves on inlet line shall be of gun metal ball type with internal water strainers, having BSP (FPT) inlet and flare type MPT outlet connection. The valves on return line shall be as above, but without the water strainer.

8 **Water Connections**

The water lines shall be finally connected to the coil of the fan coil unit, by at least 300 mm long, type L seamless solid drawn copper tubing, with flare fittings and connections.

Section-3: PUMPS

1. **General**

The various items of pump shall be complete in all respect and comply with the specification given below:

2. **Pump Sets**

The pump sets shall be vertical split casing type with end suction and top discharge flanged connections, mounted on drip proof squirrel cage induction motor with suitable starter as specified.

Pumps shall be as per IS: 1520-1960, IS: 9079, IS: 325 and shall be of the following construction:

1.	Casing	Cast Iron/Cast Steel
2.	Impeller	Bronze
3.	Shaft	High Tensile Steel
4.	Shaft sleeve	Bronze
5.	Bearings	Heavy Duty Ball/Roller bearings
6.	Base Plate	Cast Iron/Fabricated M.S.

7.	Flanges	BIS 1536/1960
8.	Packing	Graphited Asbestos
9.	Max. Speed	1500 RPM/2900 RPM
10.	Drive	TEFC motors for monobloc upto 3.7 KW & SPDP motors for higher ratings.
11.	Starter	See Section "Electrical Switchgears"

- a) Drive ratings shown are only tentative and Tenderers shall select their drivers at least 5% in excess of the maximum BHP of the pump plus transmission losses, if any. Drivers shall be supplied with starters unless otherwise stated.

3. Accessories & Fittings

The following accessories/fittings shall be provided with each pump among other standard accessories/fittings required:

- Lubrication fittings and seal piping
- Test and/or air vent cocks
- Steel channel base frame for fixing pump on the concrete foundation
- Suction and discharge pressure gauges not less than 150mm dia. and of the appropriate rating, with gauge cocks, etc.
- 25 mm G.I. gland water drain piping.

4. Installation

Pumps shall be installed as per manufacturer's recommendations. Pump set shall be mounted on concrete block which in turn is mounted on machinery isolation cork or any other equivalent vibration isolation fitting.

Concrete foundation will be made by the Contractor as per approved drawings and specifications and the isolation pad foundation bolts, etc., shall also be supplied by the Contractor. Contractor shall ensure that the foundation bolts are correctly embedded.

Pump sets shall preferably be factory aligned whenever necessary; site alignment shall be done by competent persons. Before the foundation bolts are grouted and the coupling bolted, the bed plate levels and alignment results shall be submitted to the Engineer.

5. Insulation

Pumps used for chilled water service shall be insulated so that the dismantling of pumps not affected. Insulation shall be provided in a manner so as to minimize the damage to the insulation in case of maintenance of pumps or other components.

6. Testing

Tenderers shall submit the performance curves of the pumps. They shall also be responsible for the selection of capacity and total head requirements of each pump to match his own piping and equipment layout.

On completion of the entire installation, pumps shall be tested for their discharge head, flow and B.H.P. Test results shall correspond to the performance curves.

Tenderers shall furnish the required testing instruments and arrange for their connection as required.

7. Painting

After complete installation and testing, pumps accessories and fittings shall be given two coats of approved finishing paint.

8. On-line Water Treatment Equipment

Equipment shall be fabricated from 'B' class GI pipe. It should have a metallic core with turbulence base capable of causing galvanic action. The core shape shall be such that colloidal particles should not settle on it.

Section-4: Pipes & Valves :

1. General

The scope shall comprise the supply, installation of pipe, fittings, valves, etc. and testing/balancing of complete system. Pipe sizes shown on drawing are for the guidance of Contractor and shall not relieve Contractor of responsibility of providing smooth, noiseless circulation of fluid.

2. Pipes

All piping work shall conform to quality standards and shall be carried out as per specifications and details given hereunder:

All pipes shall be of schedule 40 thick as per ANSI-B-36.1.

All pipes in sizes up to 150mm dia shall be M.S. ERW pipe heavy class as per IS: 1239-Part-I (as per latest amendment).

All pipes in sizes 200mm and above shall be M.S. ERW pipe heavy class as per IS: 3589 (as per latest amendment).

3. Fittings

The dimensions of the fittings shall conform to I.S. 1239-Part-II (as per latest amendment) unless otherwise indicated in the specifications.

All bends in sizes up to and including 150mm dia. shall be ready made of heavy duty, wrought steel of appropriate class.

All bends in sizes 200mm and larger dia. shall be fabricated from pipes of the same dia. and thickness with a minimum of 4 sections, and having a minimum centre line radius of 1.5 diameter of pipes.

All fittings such as branches, reducers, etc. in all sizes shall be fabricated from pipes of the same dia. and thickness and its length should be at least twice the dia. of the pipe.

The branches may be welded straight to the main line, without making a separate fitting, where specified on drawings or required by Corporation's Engineer.

Blank ends are to be formed with flanged joints and 6mm thick blank between flange pair for 150mm and over in case where, a future extension is to be made, otherwise blank end discs of 6mm thickness are to be welded on, with additional cross stiffeners from 50mm x 50mm x 5mm heavy angles.

1. Flanges

All flanges shall be of mild steel as per IS: 6392/71 and shall be steel slip-on-type, welded to the pipes flanges thickness shall be to suit class-II pressures. Flanges may be tack welded into position, but all final welding shall be done with joints dismantled. 3mm thick gaskets shall be used with all flanged joints. The gaskets shall be fibre reinforced rubber as approved by the Corporation's Engineer. Special adhesive compound shall be used between flanges of steam, air and gas lines.

Flanges shall be used as used as follows:

Counter flanges for equipment having flanged connections.

Flanged pairs shall be used on all such equipment, which is required to be isolated or removed for service e.g. pumps, refrigeration machines, air handling units, etc.

All threaded valves shall be provided with nipples and flanged pairs on both sides to permit flange connection, for removal of valves from main lines for repair/replacement.

5. Valves

a) Butterfly Valves, Gate Valves, Globe Valves and Check Valves:

All gate valves, globe and check valves up to and including 40mm dia. Shall be of gun metal screwed type, conforming to class 1 of IS:778.

All butterfly valves of 50mm dia. and above shall be flanged type, have cast iron body with black nitrile rubber seat and conforming to class PN-16 of IS:780 (for sizes up to 300mm) and of IS:2906 (for sizes 350mm and above).

All globe and check valve of 50mm dia. and above shall be flanged type in cast iron construction and conforming to class PN-16.

Air valves shall be provided at all higher points in the piping system for venting as per the sizes shown in the BOQ.

All air needle valves shall be of gun metal and tested up to a pressure of class 1 pressure rating. All globe valves of size 50mm and above shall be of rising spindle type.

b) Balancing Valves

All balancing valves of upto and including 50 mm dia. shall be in gun metal screwed type construction. The valves of 65 mm dia. and above shall be in cast iron flanged end construction.

The valve shall have PTFE/SS disc with special erosion/ corrosion proof sealing.

The valves shall be capable of delivering metered quantity of water and subsequently should function as isolating valve. All the valves shall have built in pressure drop measuring facility to ascertain water flow rate. The valves shall have temper proof adjustable and lockable arrangement for required water quantity after commissioning. The valve shall be to the minimum requirement of IS:778 Class-1.

The valves shall be complete with drain cock, pressure test cocks, etc.

c) Miscellaneous Valves

All gauge cocks shall be of gunmetal plug type, complete with siphon (brass chrome plated).

All drain valves shall be of gunmetal with a hose union connection on one end or extended upto the drain pit as the case may be.

All valves on the supply line of fan coil units shall be of gunmetal ball type with integral water strainers, having (BSP) FPT inlet and flare type MPT outlet connection.

All valves on the return line of fan coil units shall be as above but without integral water strainer.

d) Strainers

The strainers shall either be 'pot' type or 'Y' type with cast iron or fabricated steel body, tested to a pressure of 10 kg/sq.cm. applicable for the butterfly valves as shown on the drawings.

The strainers shall have a perforated bronze sheet screen with 3mm perforation, 0.63mm thick.

Pot strainers and Y strainers shall be provided with flanged connections.

The strainers shall be designed to facilitate in easy removal of filter screen for cleaning, without disconnection of pipe line

Pot strainer shall be fabricated out of M.S. sheet and the sizes shall be as under:

Pipe size (mm)	Pot Dia (mm)	Pot HT (mm)	Basket dia (mm)	Basket HT (mm)
50	300	400	200	240
80	350	450	250	250
100	450	500	300	280
125	500	600	330	340
150	540	700	360	390
200	610	815	400	470
250	800	955	550	510
300	1000	1105	750	580
350	1190	1300	895	678
400	1350	1500	1020	785
450	1518	1700	1060	890
500	1690	1800	1100	900

6 Jointing

All pipelines shall be welded type except G.I. piping which shall have screwed connections.

Square cut plain ends will be welded to pipe upto and including 100mm dia.

All pipes 125mm dia. or larger will be beveled by 35° for welding.

7. Miscellaneous

- a) Provide all piping, required to make the apparatus connected, complete and ready for regular and safe operation. Unless otherwise noted, connect all apparatus and equipment in accordance with manufacturer's standard details, as approved by Corporation's Engineer.

Consult drawings and specifications to determine number and requirements of all items of equipment requiring piping, such as bend, drain, relief, etc. wherever equipment is provided with connections for such piping.

- b) Unless otherwise specified, pitch the lines of piping as follows:

All condensation drainage, including air handling unit and fan coil unit shall be pitched in the direction of flow to ensure adequate drainage, with an adequate trap seal to prevent leakage of air due to static pressure developed by air conditioning units. Pitch, 20mm per metre wherever possible, but not less than 10mm. Drains from other equipment shall be pitched similarly without trap seal.

- c) Provide valves and capped connections for all low points in piping system, necessary or required for draining systems. Provide for all risers isolating valves and drain valves to permit repairs without interfering with the rest of the system
- d) During construction, temporarily close, open ends of pipes with sheet metal caps, where necessary, or required to prevent debris from entering piping system.
- e) Support piping independently of all equipment so that the equipment is not stressed by the piping weight or expansion.
- f) Provide suitable platforms, etc. to facilitate the maintenance, repair and replacement of valves and fittings.
- g) Unions, if used, shall be flanged, as required, wherever indicated and in connections to all equipment, apparatus, and specialties requiring disconnection for repairs or replacement. Locate unions between shut-off valves and equipment, as directed by Corporation's Engineer.
- h) Provide shut-off valves where indicated and for individual equipment, units at inlet and outlet, to permit unit removal for repairs, without interfering with remaining of the system. Additional shut-off valves shall be provided as required to enable all systems to be fully sectionalized. By-pass and stop valves shall be provided for all automatic control valves as specified
- i) Arrange piping for maximum accessibility for maintenance and repair; locate valves for easy access and operation. No valves shall be installed with handles pointing down, unless unavoidable.
- j) Cut the pipes accurately according to measurements, established at building and work into place without springing or forcing.
- k) Pipe supports shall be adjustable for height and prime coated with rust preventive paint and finish coated with grey paint, both as approved by Corporation's Engineer. Spacing of pipe supports shall not be more than that as specified below:

Nominal pipe size (MM)	Spacing (Metres)
15	1.25
20 & 25	1.25
32, 40, 50 & 65	2.0
80, 100 & 125	2.5
150 & above	2.5

- l) Extra supports shall be provided at the bends, and at heavy fittings like valves to avoid undue stresses on the pipes. Pipe hangers shall be fixed on walls and ceilings by means of 'Hilti' metallic dash fasteners.

- m) Insulated piping shall be supported in such a manner so as not to put undue pressure on the insulation.

Hangers and supports shall be provided and installed for all piping and tubing wherever indicated, required or otherwise specified. Wherever necessary, additional hangers and supports shall be provided to prevent vibration or excessive deflection of piping and tubing.

All hangers and supports shall be made of steel or other durable and non-combustible materials, galvanized or plated. Wood, wire or perforated strap iron shall not be used as permanent hangers or supports.

Hangers shall be supported from structural steel, concrete inserts and pipe racks, specifically approved.

No hanger/equipment shall be suspended midway, between steel joists and panel points.

Drilling or punching of holes in steel joist members will not be permitted.

All pipes in AC plant room shall be supported from pipes and channels from floor.

9 Sleeves

Where pipes pass through walls, provide galvanized steel pipe sleeves 50mm larger than outside diameter of pipe without any extra cost. Where pipes are insulated, sleeves shall be large enough to have ample clearance for insulation.

Where pipes pass through outside walls or floor slab the space between pipe and sleeve shall be packed with lead wool and oakum.

The centre of pipes shall be in the centre of sleeves and sleeves shall be flush with the finished surface. Floor sleeves shall project 50mm above finished floor level.

10 Expansion or Contraction

The Contractor shall provide for expansion and contraction of all piping installed by the use of swing connections and expansion loops.

11 Arrangement and Alignment of Piping

All piping shall be arranged and aligned in accordance with the drawings as specified. Where special conditions are encountered in the field, the arrangement and alignment of piping shall be as directed by the Corporation's Engineer.

Unless otherwise specified, the piping shall be installed in a uniform manner, parallel to or perpendicular to walls or ceilings, and all changes in directions shall be made with fittings. The horizontal piping shall be run at right angles and shall not run diagonally across rooms or other piping. Wherever possible all piping shall be arranged to provide a maximum head room.

All piping shall be installed as directly as possible between connecting points in so far as the work of other trades permits. Where interference occurs with another trade whose

work is more difficult to route, this contractor shall reroute his pipes as required to avoid interference at the discretion of the Corporation's Engineer.

All piping shall be carefully installed to provide for proper alignment, slope and expansion.

The stresses in pipelines shall be guided and pipes shall be supported in such a manner that pipe lines shall not creep, sag or buckle.

Anchors and supports shall be provided wherever necessary to prevent any misalignment of piping.

Small tubing, gauges, controls or other equipment installed on any apparatus, shall not be coiled or excessive in length, but shall be installed neatly, carefully bent at all changes in direction, secured in place and properly fastened to equipment at intervals to prevent sagging. The piping shall be grouped wherever practical and shall be installed uniformly in straight parallel lines in either vertical or horizontal positions. All tubing/capillaries shall be provided with PVC sleeves to save it against frictional cuts or damage due to vibration.

12 Testing

In general, tests shall be applied to piping before connection of equipment and appliances. In no case shall piping equipment or appliances be subjected to pressures exceeding their test rating.

The tests shall be completed and approved before any insulation is applied. Testing of segments of pipe work will be permitted, provided all open ends are first closed, by blank-offs or flanges.

After tests have been completed, the system shall be drained and flushed 3 to 4 times and cleaned of all dust and foreign matter. All strainers, valves and fittings shall be cleaned of all dirt, fillings and debris.

All piping shall be tested to hydraulic test pressure of at least two times the maximum operating pressure but less than 10 kg/sq. cm. for a period of not less than 24 hours. All leaks and defects in the joints revealed during the testing shall be rectified to the satisfaction of the Corporation's Engineer, without any extra cost.

All the piping systems shall be tested in the presence of the Corporation's Engineer or their authorized representative. Advance notice of test dates shall be given and all equipments, labour, material required for inspection, and repairs during the test shall be provided by the contractor. A test shall be repeated till the entire system is found satisfactory to the above authority. The tests shall be carried out for a part of work if required by the Corporation's Engineer in order to avoid hindrance in the work of the insulation contractor.

All water and condensate pipes shall be tested and proven tight under hydrostatic pressure of 10 kg/sq.cm., unless otherwise stated, for a minimum period of 24 hours without drop in pressure.

The Contractor shall make sure that proper noiseless circulation is achieved through all piping systems. If due to poor air bond, proper circulation is not achieved, the contractor shall bear all expenses for carrying out the rectification work including finishing of floors, walls and ceiling damaged in the process of rectification.

The Contractor shall provide all labours and materials to make provision for removing water and throwing it at the proper place during the testing or/and after the testing to avoid damages to employer or other contractors properties. Any damage caused by the contractor to the employer or other contractors properties, shall be borne by the Contractor.

13. Copper Piping

Heavy gauge soft copper tubing, type M, shall be used to make connections to equipment, wherever required or specified by Corporation's Engineer.

Flare fittings e.g. flare nuts, tees, elbows, reducers, etc. shall all be of brass.

14. Refrigerant Piping

The refrigerant circuit piping shall be of carbon steel seamless, as per ASTM-A-106, grade B or BS-3602 grade 23 and dimensioned as per ANSI B-36.1, schedule 40. The fittings shall be heavy class. The pipes and fittings shall be connected by means of welded joints. The connections to gauges, controls, etc. shall be with flare fittings. The refrigerant valves, required in the circuit shall be as follows:

Valve Size	Valve Material fittings	Type of Connections
Up to 12mm	Brass pack less type	Flare
16mm and above	Brass/Steel packed	Brazed/Welded type

Note :- All valves shall be tested against leaks up to 28 kg/sq.cm.

The strainers for the refrigerant liquid line shall be 'Y' type with gun metal body and bronze filter screen of fine mesh. The filter screen shall be easily removable type without dismantling the strainer from the circuit. The moisture indication sight glass in the liquid line shall have leak proof glass on opposite sides to permit easy inspection of the liquid refrigerant. Silencers and moisture drier etc. shall be provided as part of the refrigerant piping.

Bolts wherever used shall be electro-galvanised steel. Brazed joints, in the refrigerant piping, which has leak, shall be opened and re-done. These shall in, no case be repaired by addition of brazing alloy to the joint.

15. Drain Piping

The drain piping shall be medium class galvanized steel as per IS:1239 (as per latest amendment).

The fittings shall be of as per IS: 1239 Part- II with screwed connections.

The gate valves shall be of gun metal as described earlier.

Pipe crosses shall be provided at bends, to permit easy cleaning of drain line. The drain line shall be provided up to the nearest drain trap and pitched towards the trap.

Drain lines shall be provided at all the lowest points in the system, as well as at equipments where leakage of water is likely to occur, or to remove condensate and water from pump glands. The drain pipe work shall be carried out with threaded joints only. No welded joint shall be permissible.

16. Painting

All pipes supports, hangers, etc., shall be given two coats of red oxide primer.

All pipes (insulated and non insulated) shall then be given two coats finish paint, of a type and colour as approved by the Corporation's Engineer.

Section-5: Sheet Metal Work & Air Distribution

1. Scope :

The scope of work shall include supply, fabrication and installation of site fabricated G.I. sheet metal duct as shown in the relevant duct drawing, testing at site, loading & unloading of G.I. sheets at site, and shifting the G.I. sheets and other hardware from site stores to exact location inside the office complex. The packing shall be suitable for marine transportation purpose and all other natural disasters and the same shall be transported to respective office warehouses to achieve a guaranteed commercial operation of the same to the entire satisfaction of client.

2. Materials

Ducts shall be made of either galvanized steel sheets or aluminum sheets. The galvanized steel sheet shall conform to IS: 277 – 1977 Aluminum shall be of grade SIC of B-3 as specified in IS: 177 – 1974.

Thickness of sheet shall be as per the table given below:

Maximum Side (mm)	Thickness (mm)	
	Galvanized Steel Sheet	Aluminum Sheet
Up to 750 mm	0.63	0.80
751-1500	0.80	1.00
1501-2250	1.00	1.50
2250-2500	1.20	
Plenums and Ducts above 2500	1.60	

- The bracing shall be as per ISS 655-1964. Supports for ducts at 2.4m distance apart up to 2250/1.2m distance apart for larger ducts.

▪ Ducts shall be rectangular in cross section and fabricated in accordance with the following table :

Maximum Side of Duct (mm)	Minimum Thickness of Sheet (mm/SWG)	Transverse Joints	Reinforcement	Hang er Rod Dia (mm)
Up to 400	0.63 (24 SWG)	25mm pocket/s slip	Cross Break	8
401 to 750	0.63 (24 SWG)	25mm pocket/s slip	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
751 to 900	0.80(22SWG)	38x38x4.2 Companion Flanges	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
901 to 1500	0.80(22SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10
1501 to 2250	1.00(20SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10
2250 and above	1.25(18 SWG)	50x50x4.2 Companion Flanges	50x50x4.2 Girth angle @ 610 mm c/c	12
Plenums	1.25(18 SWG)	50x50x6.4 Companion Flanges	50x50x6.4 Girth angle @ 610 mm c/c	12

Rounds Ducts :

Round Ducts 150 mm dia to 500 mm dia.
Round Ducts 501mm dia to 750 mm dia
Round Ducts 751 mm dia to 1000 mm dia.

GSS

24 Gauge
22 Gauge
22 Gauge

Aluminium

22 gauge
22 gauge
20 gauge

Girth angles and companion flanges shall be mitered and welded at corners and riveted to duct sheets at 75mm centers. Flanged joints shall be made with 9.5-mm GI bolts spaced at 1.5cm centers and provided with 4.2mm rubber or 6.0mm. All joints and seams shall be rendered airtight. All duct seams and joints to be sealed with silicon sealant to stop supply air leakage. Duct panels are not to be cross-broken if insulated. Longitudinal seams shall be inside groove of Pittsburgh type. All ducting supports, bracing and framework shall be painted with 2 coats of epoxy primer and 2 coats of epoxy paint min. (50 microns).

3. Accessoires:

- All dampers, except where shown, shall be louver dampers having multiple opposed blades type or with parallel blades of airfoil construction. The construction of the dampers shall be robust and tight fitting. They should be made from 18 gauge galvanized sheets. The depth should be minimum of 150mm and flanges of 40mm. Blades shall be connected with a suitable linkage for operation by an extending lever, which shall have a locking quadrant with positions of the damper indicated on it. Dampers and their operating

device shall be made robust, easily operable and accessible through suitable access doors in the ducts.

- Dampers shall be provided in ducts at every branch supply or return air duct connections whether or not indicated on the drawings for the proper volume control and balancing the system.
- Where shown, splitter dampers shall be installed. This damper consists of double thickness airfoil blade hinged on the downstream edge. The operating lever shall extend outside the duct and insulation with an airtight hub and locking arrangements. The thickness of the damper blades shall be the same as the duct in which they are installed but not less than 1.5mm thickness.
- Fire dampers shall be motorized / solenoid type wherever specified shall be provide in the ducts to minimize spreading of fire through ducts, i.e. points where duct passes fire (rated 1 ½ hrs. or more) wall or slab. Fire dampers shall be 230mm – deep and face area as required. The outlet casing of the damper shall be fabricated out of 12 gauges M.S. sheet duly epoxy painted with two coats. The louvers shall be provided with smooth pivoted linkage, tripping mechanism of steel bar with heavy-duty spring assembly and provision of motor. The louvers to be arranged to pivot and hold in an open position and can be closed by an electrically operated motor. The damper is used in conjunction with a smoke alarm system. The entire assembly shall be duly epoxy primer of 2 coats (epoxy paint) or aluminum spray painted. The dampers shall be designed for automatic as well as manual tripping.
- Motors shall be rated for fire damper (spring to close power to open) operation and shall be suitable for outdoor installation (IP55). Fire dampers are closed on a signal from the fire control module. Module supply and wiring by fire control contractor.
- Motorized dampers should be single flap dampers with 18 gauge construction with Belimo or Equivalent make spring return type. Opening time should be more than 75secs. And closing time should be 30secs. The power shall be given from the electrical panel and will be routed through the unit.
- 300mm X 300mm access panels with gasket neoprene and stud bolt type shall be provided near lower dampers/ splitters dampers and fire damper. All main ducting work shall be accessible throughout using tight fitted hinged access doors. Doors shall be cemented sponge rubber gaskets of 6mm thickness. Felt is not acceptable. In the case of insulated ducts with access doors, the same shall be properly insulated, such that it can be operated without damaging the duct insulation and there should be no condensation either on the access doors or on the ducts when the plant is running.

4. Installation Guidelines

- The duct fabrication and installation shall generally confirm to IS 655-1963.
- All ducts shall be supported from the concrete slab or beams. Duct supports shall be fixed through the use of two anchor fasteners for each leg. The anchor fasteners shall be of approved make. If ducting is supported from steel structure, Beam Clamps shall be provided. In no case shall the duct be supported from the false ceiling hangers or be permitted to rest on a hung ceiling.
- Transverse joints shall be provided with rubber gaskets (6mm thk.) of nonflammable type. Use of felt shall not be permitted.
- Wherever the ducts are acoustically lined, the duct size shall be increased by the thickness of the duct lining.
- The contractor shall provide and neatly erect all sheet metal work as per the specifications and drawings. This work, in all its parts and details, shall meet with the approval of the Engineer

- The contractor shall make all necessary allowances and provisions for beams, pipes or other obstructions in the ducting, whether or not the same has been shown in the drawings. Wherever necessary to avoid beams or other structural works, plumbing or other pipes / conduits, the ducts shall be transformed, divided or curved to one side as approved or directed by the Engineer. However the required cross-sectional area shall be maintained.
- All metal work shall be done in dead or furred down spaces so as not to cause any delay to other contractors on the building.
- If a duct cannot be installed as shown in the drawings, the contractor shall install the duct between the required points by any path available subject to the approval of the Engineer and Architect.
- All ducts shall be rigid and shall be adequately supported with standing seams, tees or angles of ample size wherever required to keep the ducts true to shape, prevent buckling, vibration and breathing.
- All duct joints shall be tightly fitted using rubber gasket of nonflammable type and all interior surfaces shall be smooth. Bends shall be made with radius not less than one-half of the width of the duct or with properly designed interior curved vanes. Two vanes shall be spaced such that the aspect ratio of each of the individual elbows formed by the vane will be about five to one.
- All sheet metal connections, partitions and plenums required to confine the flow of air to and through the filters and fans, shall be constructed from 16G galvanized iron thoroughly stiffened with 25mm X 25mm angle iron braces and fitted with all necessary doors as required to give access to all parts of the apparatus. Doors shall not be less than 46 cm X 71cm. Sheet Metal connections to indoor units shall be flexible, double thickness fiberglass cloth or equivalent nonflammable material of 100mm long.
- Where metal ducts or sleeves terminate in woodwork, brick or masonry openings tight joints shall be made by the means of closely fittings heavy flanged collars.
- Resist flex or similar vibration isolation material of 6mm thickness shall be provided between ducts and duct support.
- Where ductwork is connected to rotating equipment duct such as fans, air handling units (indoor unit of split/package system), the connections shall be made with double thickness nonflammable flexible material, 100mm long.

5. Grilles and Diffusers:

- **Supply Air Side Wall Outlets**

- Wherever specified in the B.O.Q. shall be in Aluminum construction.

- **Double Deflection Grilles:**

- Wherever specified in the B.O.Q. shall be in Aluminum construction. Aluminum double deflection grills for supply air shall be provided with vertical and horizontal adjustable bars and an approved blade damper adjustable from the front face of the grille. The grilles will be powder -coated in a shade as given in the schedule of finishes of this handbook.

- **Fixed Bar Linear Grilles**

Fixed bar grilles will be in extruded aluminum construction. Bars shall be fixed in position using vertical tie bars. Bar spacing shall not exceed 12mm and the grilles shall have 60% free area. Deflection angle of the bars shall be 0. The grilles will be powder coated in a shade as per the owner/architect. Irrespective of grille finish, vertical tie bars shall be powder coated in Matt black. Supply air outlets shall be provided with volume control dampers to be installed in the duct collar. Dampers shall be in black Matt powder coated finish. Where required by the Architects/Consultants, the grilles shall be provided with a margin on all sides. Supply air outlets shall be provided with end closure pieces

for the supply portion of the grille. The end closure pieces shall not come to the grille face.

- Continuous grilles shall butt with hairline joints and be provided with interlocking splines.
- All return air grilles shall be similar and equal to the above as determined by consultants.
- All exhaust air grilles shall be similar and equal to the supply air grilles specified above.

6. Ceiling Outlets:

Square / Rectangular Diffusers:

Shall be of aluminum construction wherever specified in the BOQ. Corners of inner and outer cores shall be assembled to provide precise mitered corners. Supply air diffusers shall be provided with multi blade butterfly dampers. Damper flaps shall be provided with a nylon worm gear assembly for ease of operation. Diffusers will be powder -coated in a shade as approved by client/Architect. Diffuser shall be half step down type.

7. Guidelines for Installation of Grilles/Diffuser

Installation of the grilles/diffusers shall be done by the air conditioning contractor irrespective of the type/model of false ceiling systems. The diffusers will have to be individually suspended from the duct and aligned to match the ceiling line level. In case gypsum or any other false ceiling system, all wooden frames, rectangular or circular for supply/return/exhaust air diffusers will be provided by the Air conditioning contractor.

All air outlets/return air inlets in the same room shall be of the same size unless otherwise specified.

Grilles and diffuser samples must be submitted to the consultants for prior approval before procurement and installation.

Section-6 : Duct and Pipe Insolation

Ductwork shall be insulated as per the below specified guidelines.

Painting

Angle iron Flanges, Stiffeners, hangers and supports shall be painted with 2 coats of anti-rust primer and remaining uncovered duct shall be further painted with 2 coats of synthetic enamel paints of black color.

Testing and Balancing

After completion of ducting work, system shall be tested for air leakage. Leakage if any shall be plugged and all the adjustments and balancing are completed. The air quantity readings shall be recorded. All dampers shall be set and locked in position after the final adjustments. All readings made shall be submitted to the consultants for approval.

Insulation

All tests like pressure testing should be completed and recorded. All systems shall be approved by the Consultants before insulation is applied to the equipment, duct and piping. Insulation material shall be supplied by approved manufacturers and shall be of the type specifically intended for the services required.

Ductwork & Piping Insulation Application Guidelines :

Piping and accessory insulation application shall be as follows:

- Pipes shall be thoroughly cleaned with wire brush and rendered free from all rust and grease.
- For insulation of straight pipe slip on method shall be used. For elbows and bends snap off method will be used.
- First 2 coats of specified Insulation adhesive shall be applied then the Insulation shall be fixed tightly on the surface taking care to seal all joints .
- Adequately sized PVC self-adhesive tape shall be provided to seal all joints afterwards Al cladding shall be done as per requirements.

Ductwork Insulation:

Preformed pipe sections of chemically cross linked closed cell polyethylene FR-XPE of fire retardant grade in roll form the insulation up to 32 mm thick and density shall not be less than 33 kg/m³ and the thermal conductivity shall be 0.027kcal/hrm²C at mean temperature of 0° C. The insulation thickness shall be 9 mm on all ducts except the toilet and basement exhaust.

Pipe work Insulation :

All chilled water and drain pipes Insulation shall be as follows. The material will be TF quality Expanded polystyrene of 20kg/m³ density minimum.

10 to 40 mm pipe size	-	25 mm
50 to 100 mm pipe size	-	50 mm
Above 100 mm pipe size	-	75 mm

Acoustic Insulation

- Interior of duct shall be coated with primer. 25mm thick resin bonded fiberglass Twiga finished with RP tissue shall be fixed to duct using spot hot bitumen. All joints shall be sealed with bitumen. The acoustic lining to be covered with RP tissue and perforated aluminum sheets of 30G thickness. The lining of aluminum sheet facing to be mechanically fastened to the duct with GI bolts/nuts and washers Contractor to ensure a smooth internal finish.
- All plenums, connecting pieces connected to air handling units and return air pieces shall also be acoustically insulated.
- There shall be minimum of 75mm overlap between the acoustical and thermal insulation on ducts.

Section-7: Controls

1. General :

- 1.1 The various controls listed below shall be electrically operated and generally comply with the specifications listed below:
- 1.2 In case of low voltage controls necessary step down transformers shall be provided with each control as required.

2. Chilling Unit Control:

The Chilling machines controls shall be generally standard as per the selected manufacturer standards.

3. Air Handling Unit and Fan Coil Unit controls:

- 3.1 AHUs thermostats shall be cooling/heating suitable for mounting in the room or the return path as required. The thermostat shall be modulating potentiometer type with an adjustable throttling range and required accuracy.

3.2 2- way motorized Valve for AHUs :

The motorized water valve shall be globe type and consist of CI/gunmetal valve body with SS trim and equal percentage of flow characteristics, modulating motor and linkage. The valve shall be of 3 way mixing type.

- 3.2 The thermostat for Fan coil unit shall be space type for cooling. It shall be snap acting type, line voltage, mercury bulb type with differential of 1.1 C. It shall have minimum three speed controls complete with wiring etc.
- 3.3 The water pressure gauges shall be of robust construction 150 mm dial of suitable range and occupancy range.
- 3.4 The thermometers shall be mercury filled industrial stem type with metal casing and threaded fixing arrangement.

Section-8: Control Panel, Motors and switchgears

1. General

This specification covers the designs, material, construction features, manufacture, inspection and testing at the VENDOR'S/his sub-contractors work, delivery and performance testing of metal enclosed Medium Voltage Switchgear of voltage not exceeding 1000 V AC.

The switchgears would comprise of Motor Control Centres (MCCs) required for the supply of power to the motors of the plant for medium voltage equipment.

2. Codes & Standards

The design, construction, manufacture and performance of equipment shall conform to latest applicable standards and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

Equipment shall conform to the latest applicable standards as mentioned. In case of conflict between the standards and this specification, this specification shall govern.

All components shall be of reputed make and subject to Purchaser's approval and as per recommended manufacture.

3 Power Supply System

The incomer power supply shall be 415V, 3 phase, 3 wire, 50 Hz, effectively earthed AC system. The fault level for the switchgear shall be 40 KA for 1 sec.

Dynamic - 84 Ka (Peak) - Short time

Variation of voltage and frequency from their rated values are as below :

Variation of voltage	$\pm 10\%$
Variation of frequency	$\pm 5\%$
Combined voltage and frequency variation	$\pm 10\%$

4 Sheet Metal Work

The switchgear frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2 mm.

Frames shall be enclosed by sheet metal of thickness not less than 2 mm cold rolled or 2.5mm hot rolled, smoothly finished, levelled and free from flaws. Doors and covers shall be made of sheet steel of thickness not less than 1.6mm. Cold rolled or 2mm hot rolled. Stiffeners shall be provided wherever necessary.

All panel edges and door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforcement members.

Cut-outs shall be true in shape and devoid of sharp edges.

The complete structure shall be rigid, self-supporting, free from vibration, twists and bends.

5 Painting

All sheet steel work shall be phosphated in accordance with the following procedure and in accordance with applicable standards.

Oil, grease, dirt and swarf shall be thoroughly removed by emulsion cleaning.

Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

After phosphating, thorough rinsing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and oven drying.

Panels shall be dry electrostatic painted (powder coated).

Finished painted appearance of equipment shall present an aesthetically pleasing appearance, free from dents and uneven surfaces.

6 Constructional Features

Switchgear panel shall be :

- a) of the metal enclosed, indoor, floor mounted modular type
- b) made up of the requisite vertical sections
- c) of dust and vermin proof construction
- d) provided with a degree of protection of IP-54
- e) easily extendable on both sides by the addition of vertical sections after removing the ends covers
- f) provided with a metal frame made of structural steel channel section properly drilled for mounting the Switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated
- g) provided with labels on the front indicating the switchgear designation
- h) provided with cable entry facilities at top or bottom with 3mm thick removable plates and necessary cable glands. For 1 core cables these plates shall be non-magnetic
- i) of uniform height of not more than 2450 mm
- j) of double front execution
- k) provided with gaskets all round the perimeter of adjacent panels, panel and base frame, removable covers and doors
- l) provided with copper busbars running at the top or bottom, as required, all along the length of the switchgear in a separate sheet steel enclosure.

Operating devices shall be incorporated only in the front of the Switchgear.

The Switchgear shall be provided into distinct vertical sections each comprising:

- a) A completely metal enclosed busbar compartment running horizontally.
- b) Individual feeder modules arranged in multi-tier formation. It is essential that the modules are integral multiples of the basic unit size to provide for flexibility in changes, if any, at site.

- c) Enclosed vertical busbars serving all modules in the vertical sections. For safety isolation of the vertical busbars, insulating barrier with cut-outs shall be provided to allow the power stab contacts to engage with vertical busbars.
- d) A vertical cable alley covering the entire height. The cable alley shall be minimum 200mm wide for motor control modules and 500mm wide for circuit breaker controlled modules.
- e) A horizontal separate enclosure for all auxiliary power and control buses, as required, shall be located so as to enable easy identification, maintenance and segregation from the main power buses. Tap-off connections from these buses shall be arranged separately for each vertical section.

Each vertical section shall be equipped with space heaters which may be located in the cable alley as specified in schedule of quantities.

One metal sheet to be provided between two adjacent vertical sections running to the full height of the switchgear except for the horizontal busbar compartment. However, each shipping section shall have metal sheets at both ends.

All equipment associated with a single circuit shall be housed in a separate module compartment of the vertical section. The compartment shall be sheet steel enclosed on all sides and the rear, with the withdrawable units in position or removed, except on the cable alley side. A plate cover with a slot to permit wiring connections shall be provided on the side corresponding to the cable alley. The front of the compartment shall be provided with a hinged door.

For dial out type, modules, only the handles of control and selector switches, push buttons, knobs and cut-outs for lamps and meters shall be arranged on the front doors of the respective compartments to permit operation without opening the door. On circuit breaker controlled circuits, protective relays shall be mounted on the front door of the compartment. All other equipment pertaining to a circuit shall be mounted on the withdrawable chassis. All cut-outs shall be provided with gaskets for the purpose of dust-proofing.

Current transformers shall not be directly mounted on the buses. Current transformers on circuit breaker controlled circuits shall be mounted on the fixed portion of the compartment.

In breaker compartments, suitable barriers shall be placed between circuit breakers and all control, protective and indication circuit equipment including instrument transformers. External cable connections shall be carried out in separate cable compartments for power and control cables.

After isolation of power and control connections of a circuit, it shall be possible to safely carry out maintenance in a compartment with the busbars and adjacent circuits live.

The withdrawl chassis shall move on suitable guides and on suitably plated steel or stainless steel rollers or balls to facilitate easy withdrawal.

Cable alleys shall be provided with suitable hinged doors. It shall be possible to safely carry out maintenance of cable connections to any one circuit with the busbars and adjacent live circuits. Adequate number of slotted cable support arms shall be provided for dressing the cables.

All doors shall be provided with concealed type hinges and captive screws.

The withdrawable chassis housing circuit breakers shall be of the fully drawout type.

The chassis/base plate housing feeder control and motor control equipment not incorporating circuit breakers shall be of the fully-drawout, or fixed type.

a) Fully Drawout Type

In this type of construction it shall be possible to drawout the withdrawable chassis without having to unscrew or unbolt any connections to the equipment mounted on the withdrawable chassis. The power and control drawout type connections shall be of the stab-in or sliding type. All drawout contracts, including the auxiliary and control wiring shall be of self-aligning type.

b) Fixed Type

In this type of construction all power connections to the equipment mounted on the base plate shall be of the bolted type. All control circuit connections to equipment mounted on the base plate shall be carried out through conventional terminal blocks mounted in the respective base plate. It shall be possible to remove the base plate after unbolting/unscrewing all the power and control circuit connections to the equipment mounted on the base plate.

c) Interchangeability

All identical equipment and corresponding parts including chassis of drawout modules of the same size shall be fully interchangeable, without having to carry out modifications. For trouble free interchangeability, the drawout arrangements shall be designed such that normal dimensional variations are taken care of by self-aligning feature of the modules. Components and equipment that are not fully interchangeable will be rejected. VENDOR shall replace all such equipment by fully interchangeable equipment at his cost.

Switchgear shall be designed in such a way that all component equipment and bus bars operate satisfactorily without exceeding their respective maximum permissible rise in temperature under ambient temperature conditions prevailing with the switchgear cubicle, with reference ambient temperature outside the switchgear cubicles.

All dummy cubicles necessary to meet the requirements of this specification shall be included in the VENDOR's scope.

No equipment/devices associated with a particular circuit shall be mounted in any other circuit module.

7 Main And Auxiliary Buses

a) Main buses & Tape

Switchgear shall be provided with three phase busbars and neutral.

Busbars shall be of uniform cross section throughout the length of the switchgear.

The busbars shall be made of high conductivity copper alloy of E91E grade.

Busbars shall be provided with at least the minimum clearances in air as per applicable standards for a 500V, 3 phase system.

All bus-bars, bus-taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free plastic insulation of high dielectric strength (450 V/mil) to provide a permanent high dielectric non-ageing and non-tracking protection; impervious to water, tropical conditions and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colours to indicate phase. The joints shall be insulated in such a way as to provide for accessibility of contact bolts for maintenance. The dielectric strength and properties shall hold good for the temperature range of 0 deg.C to 90 deg.C.

Busbars shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents for the associated switchgear. Busbars supports shall be made of Hylam sheets, glass reinforced moulded plastic material, permali wood or cast resin.

Separate supports shall be provided for each phase of the busbars. If a common support is provided for all three phases, antitracking barriers shall be incorporated.

Busbar joints shall be complete with high tensile steel bolts and lock washers and nuts. Busbars shall be thoroughly cleaned at the joint locations and a suitable contact grease shall be applied just before making a joint.

b) Auxiliary Buses

Auxiliary buses for control power supply, space heater power supply or any other specified service shall be provided. These buses shall be insulated, adequately supported and sized to suit specific requirements. The material of control power supply buses shall be electrolytic copper. The material for space heater power supply buses shall be same as that for the main power buses. Supply transformer(s), auxiliary busbars and necessary connections to the supply transformers and associated circuits shall be in the VENDOR's scope.

8 Circuit Breakers

a) Circuit breakers shall be of the airbreak drawout type, mounted along with its operating mechanism on a wheeled carriage moving on guides, designed to align correctly and allow easy movements.

- of the shunt trip type.
- provided with an operating mechanism of the type specified.

- provided with mechanically operated targets to show 'Open', 'Closed', 'Service' and 'Test' positions of the circuit breaker.
- provided with mechanical operated, red 'trip' push button, shrouded to prevent accidental operation.
- provided with locking facilities in the 'Service', 'Test' and 'Isolated', positions. In test position the breaker will be tested without energising the power circuits. The breaker shall remain fully housed inside the compartment in the test position.
- provided with 6 No. and 6NC potential free auxiliary contacts, rated 10A at 240V A.C. and 1A (inductive breaking) at 220 V D.C.
- provided with 'red', 'green' and 'amber' indicating lamps to show 'closed', 'open' and 'auto-trip' conditions of the circuit breaker when breaker operation is controlled by a control switch.

b) Circuit breakers shall be provided with the following interlocks.

It shall not be possible to plug-in a closed circuit breaker, or to drawout a circuit breaker in the closed position.

It shall not be possible to operate a circuit breaker unless it is in the fully plugged-in, test, or fully isolated position.

c) Circuit breaker closing and trip coils shall be rated for satisfactory operation on a control supply system indicated in Data Sheet-A.

d) Closing and trip coil shall operate satisfactorily under the following conditions of supply voltage variation :

Closing coils-85% to 110% of rated voltage.

Trip coils-50% to 110% of rated voltage.

The breakers controlling motors shall operate satisfactory under following conditions :-

- i) Direct-on-line starting of the specified motor.
- ii) Breaking no load current of the specified motor.

e) Operating Mechanism

Circuit breaker shall be provided with operating mechanism as specified .

Power operated mechanism shall be of the motor wound spring charging stored energy type.

The closing action of the circuit breaker shall charge the tripping spring ready for tripping.

Speed of closing of contacts shall be independent of the speed with which the handle is operated.

All stored energy mechanisms shall be provided with mechanical indicators to show the 'charged' and 'discharged' conditions of the spring.

Circuit breakers provided with stored energy operating mechanisms shall be provided with the following interlocks.

- i) The circuit breaker shall not close unless the spring is fully charged.
- ii) Shocks, vibrations, or failure of springs shall not operate the breaker or prevent intended tripping.
Power operated mechanism shall be
- i) Provided with a universal motor suitable for operation on A.C. and D.C. control supplies specified in Annexure-A with voltage variation from 85% to 110% rated voltage.
- ii) Designed to enable a continuous sequence of closing and opening operation as long as power is available and at least one opening operation on power supply failure.
- iii) Provided with emergency manual charging facilities.

9. Moulded Case Circuit Breaker:

Moulded case circuit breakers shall be made of insulating case and cover made of high strength, heat resistant and frame-retardant thermosetting insulating material.

The switching mechanism shall be made/quick-break type utilizing a trip free toggle mechanism. The handle position shall give positive indication of whether the breaker is ON(top), OFF(down) or tripped (midway). For overload protection, three bimetal magneto-thermal release and electromagnets releases for short circuit protection to be provided. The magneto-thermal release shall be variation and direct acting. All releases shall operate on a common trip bar so that all phases are disconnected in the event when fault occurs even on only one of them.

The contacts shall be made of silver alloy and arc chutes shall be made of de-ion plates. These plates shall be housed in a vulcanised fibre casing. The arc chutes shall be capable of quenching the arc rapidly and drawing away the arc from contact tips.

The terminals shall have sufficiently large dimensions to accept links or cable lugs of suitable sizes.

10 Miniature Circuit Breakers (MCB)

- a) MCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.
- b) MCB shall be provided with overload/short-circuit protective device for protection under overload and short-circuit conditions. The minimum breaking capacity of MCBs shall be 3 KA r.m.s. at 415V/220V D.C.
- c) MCBs shall be provided with locking facility.

11 Air Break Switches

- a) Air break switches shall be of heavy duty, group operated load break, fault make type, complying with the requirements of applicable standards.
- b) The switches shall be capable of withstanding the thermal stresses caused by overloads, locked rotor and short circuit currents of values associated with protective relay settings and the let through current of the associated fuse.
- c) The switches shall be capable of withstanding the mechanical stress caused by the peak short circuit current of value equal of the cut-off current of the associated fuse.
- d) Whenever solid links are used for the connections between switches and fuses, such links shall be fitted with insulated sleeves.
- e) All live parts of the switch shall be shrouded.
- f) Switch operating handles shall be suitable for padlocking in 'OFF' position.
- g) Each switch shall be interlocked with the associated compartment door to achieve the following interlocks.

It shall be possible to open the door only when the switch is in the 'OFF' position.

It shall not be possible to close the switch with the door open.

Suitable means however shall be provided to intentionally release the interlocks specified above for making trip setting adjustments and operation tests.

12 Fuses

Fuses generally shall be of the HRC cartridge fuse-link type having a certified rupturing capacity of not less than 80 kv at 440 V. Fuses upto 63A for distribution systems of medium short circuit levels may be of HRC cartridge screw-cap type, having a certified rupturing capacity of not less than 46ka at 440 V and 16 KA at 250V DC.

Fuses shall be provided with visible indication to show that they have operated.

Fuses shall preferably be mounted on moulded plastic carriers and shall be complete with fuse bases.

Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug in type of bases. In such cases an insulated fuse pulling handle shall be provided for each size of fuse for each switch board.

13 Motor Starters

a) Contactor

Motor starter contactors shall be of the electromagnetic type rated for uninterrupted duty as defined in applicable standards.

Main contacts of motor starter contactors shall be of silver plated copper.

Each motor-starter contactor shall be provided with two NO and two NC auxiliary contacts.

Insulation class of operating coils shall be class B or better.

Operating coils of contactors shall be suitable for operation from the specified control supply system.

Contactors shall be of the double break, non-gravity type.

One number spare auxiliary contactor with 4 No./4NC contact along with its coil completely wired up to the terminal should be provided.

b) Direct-On-Line Starters

Direct-on-line starters shall be suitable for Class AC 3 utilisation category.

c) Reversing Starters

Reversing starters shall comprise forward and reverse contactors, electrically interlocked with each other.

Reversing starters shall be suitable for Class AC 4 duty.

d) Thermal Overload Relays

Starters shall be complete with a three elements, positive acting, ambient temperature compensated, time lagged thermal overload relay with adjustable settings. The settings range shall be properly selected in accordance with the rating of the motor.

Thermal overload relays shall be hand reset type.

'Stop' push button of the starter and hand reset device shall be separate from each other.

Overload relay hand reset push button shall be brought out on the front of the compartment door.

Overload relay shall be provided with at least one 'NO' and one 'NC' or one change-over contact.

14 Current Transformers

Current transformers shall be of the dry type.

Current transformer shall have a short time withstand rating equal to the short time withstand rating of the associated switchgear for one second.

Unless otherwise specified, the minimum performance requirement of current transformers are as follows :-

- a) Measuring CTs-7.5VA, accuracy class 1.0 and an instrument safety factor of 5.
- b) Protective CTs - 7.5 VA, accuracy class 5P and an accuracy limit factor of 10.

Notwithstanding the above it shall be the VENDOR'S responsibility to coordinate the current transformer burden with the requirements of relays, instruments and leads associated with that particular current transformer.

Test links shall be provided in both secondary leads of the CTs to easily carry out current and phase angle measurement tests.

All current transformers shall be earthed through a separate earth link on the terminal block to permit easy measurement of the current transformer insulation resistance. (CTs built-in with the thermal relays of the contactors are excluded).

15 Voltage Transformer

Voltage transformers shall be of dry type.

Unless otherwise specified, the minimum performance requirements of voltage transformers are as follows :

- a) Measuring VTs - 15 VA per phase and accuracy class 1.0.
- b) Protective VTs - 15 VA per phase and accuracy class 1.0.
- c) Dual purpose VTs - 100 VA and dual accuracy class 1.0/3.0 for metering and protection respectively. VA is per phase.

All secondary windings of voltage transformers including open delta windings shall be rated for 110/ 3 V per phase.

Voltage transformers shall have a continuous overvoltage factor of 1.2 and short time overvoltage factor as follows :

1.5 for 30 seconds in case of effectively earthed. 1.9 for 8 hours in case of non-effectively earthed system.

Voltage transformers shall be complete with suitable rated primary, secondary and tertiary fuses. Primary fuses shall have a rupturing capacity equal to the rupturing capacity rating of the associated switchgear. Fuses shall be provided on each sub circuit.

It shall be possible to replace voltage transformers without having to de-energise the main bus bars.

The terminals of V.T. secondary and tertiary windings which are required to be connected to earth shall be earthed by an isolating link without a fuse.

Single phasing preventers relay shall be provided when required to protect motor against single phasing. The relay shall not operate for supply voltage unbalance of $\pm 5\%$ but shall positively operate for supply voltage unbalance of more than $\pm 5\%$. The relay shall operate in the event of a single phase fuse blowing even though the motor c.m.f. in the concerned phase is of the order of 85%.

After sensing single phasing the relay shall operate with a time delay of 2 to 3 sec. The relay shall not operate for a 3 phase power supply failure. The relay shall be of the hand reset type with a hand reset push button. Resetting shall be instantaneous and independent of the adjusted time delay in the tripping of the unit. Visual indication for the operation of the relay shall be provided.

The relay shall be suitable for application to protect reversible and non-reversible motors. The relay operation shall be independent of the motor KW rating, the loading conditions prior to the occurrence of the single phasing and rpm of the motor. The relay shall be of the fail safe type and shall operate to trip the motor when the relay internal wiring is accidentally open circuited.

16 Relays

The following clauses shall apply to the protective relays.

Relay shall be -

- a) Enclosed in dust proof flush mounting drawout type cases.
- b) Accessible for setting and resetting from the front.
- c) Provided with positive acting hand-reset flag indicators visible from the front.

Access to setting devices shall be possible only after the front covers are removed.
Access to resetting devices shall be external to the case.

Auxiliary relays shall be rated to operate satisfactorily between 70% and 110% rated voltage.

Each relay shall be provided with at least two separate voltage from contacts.

Make and type of relays shall be subject to the EIC approval.

17 Indicating Instruments and Meters

Electrical indicating instruments shall be of minimum 96mm x96mm square size, suitable for flush mounting.

Indicating instruments shall have provision for zero adjustment outside the cover.

Instrument dials shall be parallax free with black numerals on a white dial.

Ammeters provided on motor circuits shall be provided with a suppressed extended scale to indicate motor starting current.

Watt-hour meters shall be of the direct reading electro-dynamometer type complete with cyclometer type dials and reverse running stops.

18 Indicating Lamps

Indicating lamps shall be :

- a) of the filament type and of low watt consumption
- b) provided with services resistors
- c) provided with translucent lamp covers of colours 'Red', 'Green' and 'Amber' as required in the control wiring diagrams.

Bulbs and lenses shall be easily replaceable from the front.

19 Control and Selector Switches

Control and selector switches shall be:

- a) of the rotary type
- b) adequately rated for the purpose intended (Minimum acceptable rating is 10A continuous at 240V AC and 1A inductive break) 220V DC.

- c) provided with escutcheon plates clearly marked to show the positions.

Control switches for circuit breakers shall be provided with pistol grip type handles.

Control switches for circuit breaker control shall be provided with

- a) contact development and sequencing device.

Selector switches shall be :

- a) of the maintained contact stayput type. Switches in ammeter circuits shall have make-before-break type contact.

- b) provided with oval handles.

20 Push Buttons

Push button shall be :

- a) of the momentary contact, push to actuate type rated to carry 10A at 240V AC and 1A (inductive breaking) at 220V DC.

- b) fitted with self reset, 2 NO and 2 NC contacts.

- c) provided with integral escutcheon plates marked with its function.

'Start', 'Open', 'Close' push buttons shall be green in colour.

'Stop' push buttons shall be red in colour.

All other push buttons shall be black in colour.

'Emergency Stop' push buttons shall be of the lockable in the pushed position type and shall be shrouded to prevent accidental operation. Key shall not be required for the operation of the push button.

21 Space Heaters (if applicable)

Space heaters for switchgear panels shall be :

- a) suitable for operation on a supply system as specified
- b) provided with single pole MCD with overload and short circuit release
- c) provided with thermostats to cut off the heaters at 45 deg.C.

For details for spacing between terminals; clearance between gland plate and first row terminals; and size of gland plate refer Annexure - B, Table-I, II & III.

22 Cable Terminations

Suitable compression type heavy duty brass cable glands with nuts, rubber sealing ring and brass washers mounted on a removable and control cables entering the switchgear shall incorporate built in facilities for earthing the wire armour of cables. Cable glands shall be plated to avoid corrosion.

Power cable glands and crimping type lugs shall be supplied to suit the cable sizes given in clause 3. If during course of detailed engineering of the switchgear it is found necessary to provide more glands or glands of higher size than those envisaged the vendor shall provide and accommodate the same.

Wire Sizes :

The vendor shall select the power cable glands and lugs based on the following cable sizes.

Type of cable : 1100 V grade stranded aluminium conductor PVC insulated PVC sheathed armoured and outer sheathed FRSL coated cable conforming to IS:1554 Part-I.

KW Rating Service	No. of cores x conductor size(mm ²)	Approximate overall diameter/mm
Upto 3	3 x 4	18
3.1 - 7.5	3 x 6	19.5
7.6 - 15	3 x 16	24
16 - 25	3 x 35	30
26 - 40	3 x 70	34
41 - 55	3 x 120	40
56 - 70	3 x 185	49
71 - 85	3 x 240	55.5
86 - 110	3 x 400	60
111- 175	3 x 1C x 500	-
Space Heating	2 x 6	19

For supporting & clamping cable cores at regular intervals inside the cable alleys, suitable shuttled angles, up to the respective terminal blocks shall be provided.

Necessary crimping type of tinned copper cable lugs for connecting the individual cores to the respective terminals shall be provided.

23 Internal Wiring

Control wiring shall be of the rating of 650V and power wiring shall be of the rating of 1100V.

Wiring inside the switchgear shall be carried out with 1100/650 V grade, PVC insulated, stranded conductor wires. Minimum size of conductor for power circuits is 4 sq.mm copper or equivalent size aluminium conductor. Control circuits shall be wired with copper conductor of at least 2.5 sq.mm for CT circuits and 1.5 sq.mm for other circuits, the number and size of strands shall be 7 of 0.67 mm and 0.5mm diameter respectively.

Engraved identification ferrules, marked to correspond with the wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering.

Wires forming part of a tripping circuit of circuit breaker shall be provided with an additional red ferrule marked 'T'.

Spare auxiliary contacts of all equipment forming part of the switchgear shall be wired up to the terminal blocks.

Spare and unassigned modules shall be complete with internal wiring.

Wiring shall be terminated on preferably stud type terminal blocks such that the wires are connected by cable lugs with nuts and washers/lock-nuts.

Not more than two connections shall be made on any one terminal.

24 Terminal Blocks

Terminal blocks (both for power and control circuit) shall be of reputed make specially for CT and VT circuit. It shall comprise of finely threaded pairs of brass studs of at least 6mm diameter, links between each pair of studs, washers, nuts and locknuts. The studs, shall be securely locked within the mounting base to prevent their turning. Insulated barriers shall be provided between adjacent terminals.

Terminals for circuits with voltage exceeding 125 V shall be shrouded. Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminal blocks shall be segregated.

Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block is 10A.

Terminals shall be numbered for identification. Engraved white-on-black labels shall be provided on the terminal blocks, describing the function of the circuit. Where duplication of a terminal block is necessary it shall be achieved by solid bonding links.

Terminal blocks for CT secondary lead wires shall be provided with shorting and disconnecting/earthing facilities.

Terminal blocks shall be arranged with at least 100mm clearance between two sets of terminal blocks.

Control terminals for external connections shall be suitable for terminating at least two conductors each of 2.5 sq.mm size.

25 Labels

All labels shall comprise white letters on a black background.

Labels shall be made of non-rusting metal or 3-ply lamincoid, or engraved PVC.

Labels shall be properly fixed, with provision to prevent distortion due to expansion.

Size of lettering shall be 6mm.

26 Earthing

Each MCC and LCC shall be provided with an earth busbar running along the entire length of the board. Material and size of the earth busbar shall be as specified in data sheets. At either end of the earth bus, one (1) clamp type terminal with nuts, bolts and washers shall be provided for bolting the main earthing conductor of size and material indicated in data sheets. In case the earth bus is provided near top of the switchgear, one down comer at either end shall be provided for connection to the main earthing conductor.

Earth busbars shall be supported at suitable intervals.

Positive connection between all the frames of equipment mounted in the switchboard and earth busbar shall be provided by using insulated copper wires/bare busbars of cross section equal to that of the busbar, or equal to half the size of circuit load current carrying conductor, whichever is smaller.

All instrument and relay cases shall be connected to the earth busbar using 1100/650 V grade, 2.5 sq.mm stranded, copper, earthing conductor.

27 Local Push Button Stations

Constructional Features

The constructional features of the local push button stations shall be as follows :

- a) Metal enclosed, weather-proof suitable for mounting on wall or steel structures. The enclosure shall be die cast aluminium or sheet metal of 2mm thickness.
- b) Dust and vermin proof.
- c) Provide a degree of protection of not less than IP:54.
- d) Metal parts shall be given tropicalising treatment as per standards and painted with one coat of epoxy primer and two coats of light grey epoxy paint.

- e) Provided with inscription plates of rear engraved perspex with white letters on black background. The letter size shall be 6mm.
- f) Provided with two earthing terminals suitable for 8 SWG G.I. wire.
- g) Provided with removable undrilled gland plate and adequate members of cable glands for PVC insulated, armored cable. The cable entry shall be from the bottom.
- h) All local push button stations shall have locking facility. The lock switch shall have two positions "locked" and "unlocked". When in unlocked position the switch shall allow individual starting of the equipment. Start/stop push buttons provided for local operation of the equipment shall be provided on the same enclosure and stop push buttons shall be lockable in stop position. The lock switch shall be key operated.

28 Push Buttons

- a) The Open/ Close/ Start push buttons shall be of the momentary contact push to actuate type.
- b) The stop push buttons shall be stay put type with mushroom knob.
- c) All push buttons shall be :
 - i) Fitted with two (2) normally open and two (2) normally closed contacts rated to carry and break 6 Amps at 415 Volts. (10A at 240 AC).
 - ii) Provided with integral escutcheon plates marked with its function.
- d) 'Open/Close/Start' push buttons shall be green colour.
- e) 'Stop' push button shall be red in colour.

29 Wiring

The push button stations shall be as follows : Push button station Type- A - Each P.B., station shall comprise three push buttons viz. 'OPEN' 'CLOSE' and 'STOP' for control of reversible motors.

Push button station type B - Each P.B. station shall comprise two push buttons viz. 'START' and 'STOP' for control of non-reversible motors.

Push button station Type-C - Each P.B. station shall comprise only one push button i.e. 'STOP' for emergency stop function.

Power - Electricity at specified voltage (415/220V).

29.2 The controls shall be complete with actuators, probes, relays, transformers, wiring, etc.

Safety controls of chilled water unit shall be as under :

- a) Compressor - High/Low pressurestat/manual reset type
high bearing temperature safety.
- b) Chiller thermostat - Manual reset type antifreeze.
- c) Oil pressure - Differential safety switch with manual
reset button. it should have a time delay relay for
start up of the compressor.
- d) Main motor - Thermal relay to avoid overloading of
motor & overheating of winding.

Interlocks for refrigeration unit shall be :

- a) Flow switches in condenser and chiller lines to prevent compressor starting
without water flow.
- b) Oil temperature to be maintained at set point.
- c) Condenser and chilled water pumps and cooling tower fans shall be interlocked with
chilling units to prevent operation without pump and cooling tower fan running.

30 Tests

Switchgear shall be subjected to following tests :

- a) Temperature rise test on power circuits.
- b) Short time current tests on power circuits.
- c) Mechanical operation test.
- d) High voltage test.
- e) Electrical control interlock and sequential operation tests.
- f) Verification of wiring as per approved schematic.

Type tests and routine tests shall be carried out on all associated equipment as per relevant standards.

Certified copies of all type and routine test certificates shall be submitted for the Engineers approval before dispatch of the switchgear.

31 Drawings and Data

As part of proposal BIDDER shall furnish the following drawings and data:

- a) For each switchgear, overall dimension drawing showing front view, plan, elevation and cross-section.

All drawings and data sheets shall be annotated in English.

Section-9: Electrical Cabling Works***CABLES:***

PVC/XLPE insulated aluminium/Copper conductor Armored cables shall be used for connecting motors.

CABLE GLANDS:

Heavy duty compression type cable gland along with the cable lugs shall be used for termination of cables. The cable glands shall be of cadmium plates brass. For all power cables, crimped type copper cable lugs shall be provided.

The cable trays shall be channel type made out of M.S. sheets (slotted) having a minimum thickness of 2mm duly painted. (Cable trays exposed to atmosphere shall be hot dip galvanized). The Clamps used shall be Aluminium with G.I./Cadmium plated nut-bolts. The size of these trays shall be selected considering the number of cables and leaving minimum 20% spare area. The arrangement of cables in these trays shall be in Single Tier Formation.

Sharp bending of the cables shall be avoided. The radius for bending PVC insulated cable and sheath armoured cable shall not be less than 10D where "D" overall diameter of the cable. Wherever cable rises from concrete trenches, these shall be taken in G.I. pipes of suitable size. The Contractor shall make sure that the 40% area of pipe shall be free after the cable is laid.

WIRE SIZES

Final connection to the equipment shall be through flexible wiring enclosed in galvanised flexible conduit rigidly clamped at both ends. An isolator shall be provided near each motor/equipment wherever the motor/equipment is separated from the supply panel through a partition barrier or through ceiling construction. P.V.C. insulated single strand hard drawn copper conductor wires shall be used inside the control panel for connecting different components and all the wires inside the control panel shall be neatly dressed and plastic beads shall be provided at both the ends for easy identification. All the wires shall be suitably sized for motor duty.

EARTHING

Main power upto the Electrical panels in Plant rooms along with earthing shall be provided by other agency. Each panel shall be earthed to building main earthing. All the motor etc.

shall be double earthed to the panel. All three phase motors/equipment shall be earthed with two independent earth conductors as per the requirement of Indian Electricity Rules and Regulation - 1956.

DRAWINGS

Shop drawing for control panel and wiring of equipment showing the route of conduit/cables shall be got approved by the Consultant/Architect before starting the fabrication of panel and starting the work. On completion four sets of completion/"As installed" drawings incorporating all details like conduit routes, number of wires in conduit, location of panels, switches, junction/pull boxes and cable route etc. shall be furnished by the Contractor.

TESTING

Before commissioning of the equipment the entire Electrical Installation shall be tested in accordance with code of Practice IS:732-1963 (Revised) and test report furnished by a qualified and authorised person. The entire electrical installation shall be got approved by Electrical Inspector and certificate from Electrical Inspector shall be submitted. All tests shall be carried out in presence of Consultant/Architect.

Painting

All sheet steelwork shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphatising passivating and then sprayed with a high corrosion resistant primer. It shall then be baked in an oven. The finishing treatment shall be by application of synthetic enamel paint of approved shade.

Section- 10: Mode of Measurement

1 General

This specification covers measurement of various items/materials at site.

2 Unit Prices in the Schedule of Quantities

The item description in the Schedule of Quantities is in the form of a condensed resume. The unit price shall be held to include every thing necessary to complete the work covered by this item in accordance with the specifications and drawings. The sum of all the individual item prices shall represent the total price of the installation ready to be handed over.

The unit price of the various items shall include the

All equipment, machinery, apparatus and materials required as well as the cost of any tests which the consultant may request in addition to the tests generally required to prove quality and performance of equipment.

All the labour required to supply and install the complete installation in accordance with the specifications.

Use of any tools, equipment, machinery, lifting tackle, scaffolding ladders etc. required by the contractor to carry out his work.

All the necessary measures to prevent the transmission of vibration.

The necessary material to isolate equipment foundations, from the building structure, wherever necessary and suggested by the Engineer.

Storage and insurance of all equipment apparatus and materials.

The Contractor's unit price shall include all equipment, apparatus material and labour indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labour usual and necessary to complete the system even though not specifically shown, described or otherwise referred to.

3 Measurements of Sheet metal ducts, grilles/diffusers, etc.

a) Sheet Metal Ducts

All duct measurements shall be taken as per actual outer duct surface area including bends, tees, reducers, collars and other fittings. Gaskets, nuts, bolts vibration isolation pads, vanes are included in the basic duct items of the B.O.Q.

The unit of measurements shall be the finished sheet metal surface area in meter squares. No extra shall be allowed for overlaps.

All the guide vanes, deflectors access panels, splitter dampers within the duct work shall be considered as part of the duct and nothing will be paid extra on this account.

The unit duct price shall include all the duct hangers, supports and 'Hilti' metallic fasteners as well as any materials and labour required to complete the duct frame.

b) Box Dampers

Box dampers wherever shown or required in ducts shall be measured as per finished inside cross-sections and paid as per the calculated area in sq.m.

c) Grilles/Diffusers

All measurements of grilles/diffusers shall be the nominal outlet size excluding the outer flanges.

The square or rectangular grilles/diffusers shall be measured in plain sq.m.

All round diffusers shall be measured by their diameters in centimeter.

All linear diffusers shall be measured as per actual length in meters.

4 Measurements of Piping, Fittings, Valves, Fabricated Items**a) Pipe (Including Water Piping, Oil Piping, L.P. Gas Piping, Air Piping, Vacuum Piping, etc.)**

All pipes shall be measured in linear meter (to the nearest Cm.) along the axis of the pipes and rates shall be inclusive of all fittings e.g. tees, bends, reducer, elbows, hanger support bracket, etc. Deduction shall be made for valves in the line.

The rate quoted shall be inclusive of cutting holes, 'Hilti' metallic fasteners and inclusive of all items as specified in specifications and Schedule of Quantities.

Rates quoted shall be inclusive of providing and fixing vibration pads and wooden pieces, wherever specified or required by the Corporation's Engineer.

Flexible connections, wherever required or specified shall be measured as part of straight length of same diameter, with no additional allowances being made for providing the same.

The length of the pipe for the purpose of payment will be taken through the centre line of the pipe and all fittings (e.g. tees, bends, reducers, elbows, etc.) as through the fittings are also presumed to be pipe lengths. Nothing extra whatsoever will be paid for over and above the fittings. For valves and flanges, section 1.16.3.2 below applies:

b) Valves and Flanges

All the C.I. and G.M. valves shall be measured according to the nominal size in mm and shall be measured by number. Such valves shall not be counted as part of pipe length hence deduction in pipe length, will be made wherever valves occur.

All gate and globe valves shall include two nos. of flanges and two numbers 150 mm long M.S. nipples, with one side threaded matching one of the valves, and other welded to the M.S. slip-on- flanges.

Rate for all valves shall also include the necessary number of bolts, nuts and washers, 3mm thick insertion gasket of required temperature grade companion flanges and all items specified in the specification.

The rates quoted shall be inclusive of making connections to the equipment, tanks, pumps, etc. and the connection made with an installed pipe line shall be included in the rates as per the B.O.Q.

c) Structural Supports

Structural supports including supports fabricated from pipe lengths for pipes shall be measured as part of pipe line and hence no separate payment will be made. Rates shall be inclusive of hoisting, cutting, jointing, welding, cutting of holes and chases in walls, slabs or floors, painting supports and other items as described in specifications, drawings and schedule of quantities or as required at site by Corporation's Engineer.

d) Copper Connections for Fan Coil Units

Copper connection assembly for making connections to the fan coil units shall be measured, as part of the fan coil unit price and shall include brass flare nuts, brass tees, brass reducers, fittings, fixing of automatic 3 way valve, making connections and leak testing, complete assembly as per specifications and drawings. Nothing extra shall be payable on account of any variation in the length of copper pipe.

5 Painting

Painting of all pipes, supports, valves and fittings shall be included with the cost of these items. Nothing extra shall be paid for this work.

Painting of grilles/diffusers, tanks and equipment wherever required shall be in the cost of these items.

6 Insulation

Measurement of insulation for vessels, piping, equipment and ducts shall be made over the bare uninsulated surface area of the metal.

a) Pipes

The measurements for insulation of piping shall be made in linear meters through all valves, flanges, and fittings. Pipes/bends shall be measured along the centre line radius between tangent points. If the outer radius is R1 and the inner radius is R2, the centre line radius shall be measured as $(R1+R2)/2$. Measurement of all valves, flanges and fittings shall be taken in running metre of pipe line as if they are also pipe lengths. Nothing extra over the above shall be payable for insulation over valves, flanges and fittings in pipe line/routings. Fittings that connect two or more different sizes of pipe shall be measured as part of the larger size.

b) Ducts

The measurements for insulation of ducts shall be made in actual square meters of bare uninsulated duct surface.

In case of bends the area shall be worked out by taking an average of inner and outer lengths of the bends. Measurements for damper, flanges, fittings shall be for the surface dimension for the connecting duct. Nothing extra over the above shall be payable for insulation over dampers, flanges and fittings in duct routing.

c) Vessels

The area of standard dished and flat ends of vessels shall be measured as the uninsulated body of the shell. Areas for other shapes shall be the actual calculated area. There shall be no deduction or additions for nozzles, handle ribs, dampers, expansion joints etc. all projections on vessels or tanks shall be measured separately as pipe/duct.

d) Accessories Insulation

The unit of measurement for accessories such as expansion tank, pumps, chiller heads etc. shall be of uninsulated area in square meters. In case of curved or irregular surfaces, measurements shall be taken along the curves. The unit insulation price shall include all

necessary adhesives, vapour proofing and finishing materials as well as additional labour and material required for fixing the insulation.

e) Acoustic Duct Lining

In case of acoustic lining of air ducts, measurements of the bare inside duct surface in square meter, shall be final for billing purpose.

The insulation/acoustic treatment shall include cost of battens/sections, supports, adhesives, vapour proofing, finished tiles/boards/sheets as well as additional labour and materials required for completing the work.

f) Roof and Wall Insulation and Acoustic Treatment

The unit of measurement for all under deck roof insulation wall insulation, wall/roof acoustic panel shall be the acoustic uninsulated area of walls, roofs, to be treated, in square meters.

The insulation/acoustic treatment shall include cost of battens supports, adhesives, vapour proofing, finished boards/sheets as well as additional labour and materials required for completing the work.

g) Acoustic Baffle Boxes (wherever required)

The unit of measurement shall be the exposed inside face of the acoustic baffle boxes in square meters.

The unit price shall include all hold fasts, nuts, bolts connecting the size of wall opening and making it good as well. Any additional materials and labour to fabricate and fix the boxes.

LIST OF BUREAU OF INDIAN STANDARD CODES

IS:277-1992	-	Galvanized steel Sheet (plain & corrugated)
IS:544-1985	-	Dimension for pipe Threads
(Reaffirmed 1996)		
IS:778	-	Valves (gate/globe/check type)
IS:655-1963	-	Metal Air Ducts
IS:13095-1991	-	Butterfly Valves
IS:659-1964	-	Air-conditioning (safety codes)
IS:1239-1990/92	-	Mild Steel Pipes
IS:325	-	3 phase induction motor
IS:822	-	Code of procedure for inspection of welds
IS:900	-	Code of practice for installation and maintenance of motors
IS:6392	-	Steel Pipe Flanges
IS:1822	-	Motor starters for voltage not exceeding 650 Volts
IEC	-	Relevant Sections
IS:996	-	Single phase small A.C. Motors
IS:4894-1987	-	Centrifugal Fans
IS:1554(I)	-	PVC Insulated (heavy duty)electric cables for working Voltage upto and including 1100 Volts
IS:8623-1993	-	Bus Bar Trunking System
IS:8828-1996	-	Miniature Circuit Breakers
& IEC898-1995		
IS:9537-1981 Part II	-	Rigid steel conduit for electrical wiring
IS:10810-1989	-	Method of Test of Cables
IS:13947-1989	-	Circuit Breakers
IS:13947-1993	-	Switches, disconnections, fuse combination units
IS:139-1993(Part IV)	-	Contactors & Motor Starters

LIST OF PRINCIPAL MAKES / BRANDS OF VARIOUS MATERIALS

2. Materials used in the work should be from the following list of principal makes/ brands. In case of non-availability of these makes/brands, Chief Engineer shall allow materials licensed by BIS bearing "ISI" monogram at par with principal makes.
3. For all other manufactured materials for which principal makes are not mentioned the materials allowed to be used in the work shall have BIS certification and samples for which are to be got approved prior to use of the same in the work.
4. For some materials BIS certification may not be available. In such cases the samples shall have to be got approved before using in the work.

S. No	ITEM DESCRIPTION	APPROVED MAKES (S)
1.	AIR HANDLING UNITS	FLAKTWOOD, ZECO, EDGETECH, WAVES, VTS
2.	CUSHY MOUNTS / VIBRATION ISOLATORS a) SPRING TYPE b) RUBBERISED PADS	a) DUNLOP, POLYBOND b) AEROFLEX OR EQUIVALENT APPROVED
3.	MS PIPES / GI PIPES (CLASS "C")	TATA, ZENITH, JINDAL, PRAKASH SURYA, TT SWASTIK, GST.
4.	BUTTERFLY VALVES / BALANCING VALVES	AUDCO, ADVANCE, DANFOSS, HONEYWELL, CASTLE
5.	ALUMINIUM GRILLS	DYNACRAFT, MAPRO, GREENHECK, AIRFLOW, RAVISTAR
6.	DIFFUSERS & DAMPERS FOR SAME	SACHINS, COSMOS, CARYAIRE, AIR MASTER, AIRFLOW, RAVISTAR
7.	FIRE DAMPERS	DYNACRAFT, MAPRO, GREENHECK, AIRFLOW, RAVISTAR
8.	DUCT DAMPERS	DYNACRAFT, MAPRO, GREENHECK, AIRFLOW, RAVISTAR
9.	INSULATION A) FIBERGLASS/ RESIN BONDED GLASSWOLL B) EXPANDED POLYSTYRENE C) INSULATION PROTECTING COATING	A) BEARDSSELL/ ARMASELL / UP TWIGA / LLOYED / OWENS CORNING B) BEARDSSELL/ ARMASELL / UP TWIGA / LLOYED / OWENS CORNING C) STAR BOND 30-36
10.	PVC PIPES	PRECEISION, AVON PLAST, ESSARKE, SUDHAKAR, KALINGA, AKG
11.	CABLES ISI MARK, 1100V (GRADE) IS 1554	FINOLEX, FORT GLOSTER, CCI, RR KABLE, DELTON
12.	CABLES ISI MARK, 1100V (GRADE) IS 7098	FINOLEX, FORT GLOSTER, CCI, RR KABLE, DELTON

Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

13.	WIRES : 1100V (GRADE) ISI MARK FR	FINOLEX, HAVELLS, RR CABLES, V GAURD
14.	M.S. CONDUITS ISI MARK	SUPREME, BIC, NIC, AKG
15.	PVC CONDUITS & ACCESSORIES ISI MARK (HG)	PRECEISION, AVON PLAST, ESSARKE, SUDHAKAR, KALINGA AKG
16.	CABLE GLANDS & LUGS	COMET, DOWELLS, BRACO, SIEMENS
17.	GI SHEET	JINDAL/SAIL/TATA
18.	PRESSURE INDEPENDENT CONTROL & BALANCING VALVE	DANFOSS/JOHNSON CONTROL/SIEMENS
19.	Y-STRAINERS	RAPIDCONTROL/ SANDHU / MAHARAJA / EMERALD
20.	CHECK VALVES (WATER DUTY)	ADVANCE / INTER VALVE / CASTLE
21.	TWO WAY/THREE WAY VALVES	HONEYWELL / JOHNSON CONTROL / SAUTER / LANDIS & STAEFA
22.	BALL VALVES	RAPID CONTROL / LEADER / CASTLE
23.	PRESSURE GAUGES	H. GURU / FEIBIG / SANT ENGG / EMERALD
24.	THERMOMETERS	H. GURU / EMERALD / JAPSIN / FIEBIG
25.	WATER FLOW SWITCH	RAPID CONTROL / ANERGY / ABB
26.	MODULATING MOTOR	HONEYWELL / JOHNSON CONTROL / BELIMO / RAPID CONTROL
27.	PROPORTIONAL THERMOSTATE	HONEYWELL / JOHNSON CONTROL / SIEMENS
28.	SELF ADHESIVE SEALING GASKET FOR DUCTS	PRIMA S EAL / AIR FLOW / TROCELLEN
29.	ELECTRIC MOTORS	SIEMENS / ABB / CROMPTON
30.	DASH FASTENERS	HILTI / FISCHER / CANNON / WURTH
31.	EXTRUDED ALUMINIUM SECTION	MAHAVIR / JINDAL
32.	AUTOMATIC AIR VENT	MAHAVIR / RAPID CONTROL / ABB / CASTLE

SPECIAL CONDITIONS OF CONTRACT:**1. SCOPE OF WORK**

The scope of work is to carry out the work of Replacement of AHU installed at Jeevan Bharti Building, Connaught Place, New Delhi.

2. SITE & ITS LOCATION

The proposed work is to be carried out for "JEEVAN BHARTI" Building, 124 Connaught Circus, New Delhi.

3. SITE VISIT

The Tenderer must obtain himself on his own responsibility and his own expenses all information and data which may be required for the purpose of filling this Tender document and enter into a Contract for the satisfactory performance of the work. The Tenderer is requested satisfy himself regarding the availability of water, power, transport and communication facilities, the character, quality and quantity of the materials, labour, the law and order situation, climatic conditions local authorities requirement, traffic regulations etc. The Tenderer will be fully responsible for considering the financial effect of any or all the factors while submitting his Tender.

Site is a working Premises. Hence the contractors are advised to engage adequate housekeeping team to maintain the Premises neat & clean. The work should be carried out without disturbing the office. The AHU work should be completed within stipulated time period as per the tender terms & conditions and specification. Keep all necessary precautions to be taken during the execution of work.

4. INSPECTION OF WORK:

LIC of India or their representatives shall at all reasonable times have free access to the work site and/ or to the workshop, factories, or other places where materials are lying or from where they are obtained and the Contractor shall give every facility to the LIC of India and their representatives necessary for inspection and examination and test of the materials and workmanship. No person unless authorized by the LIC of India except the representative of Public Authorities shall be allowed on the work at any time. The proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner organization a wing of Central Vigilance commission.

5. NOTICE OF OPERATION

The Contractor shall not carry out any important operation without the Consent in writing from the LIC of India.

6. WORK DURING PLANNED SHUTDOWN, NIGHTS AND HOLIDAYS

Subject to any provision to the contrary contained in the Contract no permanent work shall save as herein provided be carried on during the night or on holidays with the permission in writing from LIC of India, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the work in which case the Contractor shall immediately advise the LIC of India. However the provisions of the clause shall not be applicable in the case of any work which becomes essential to carry by rotary or double shifts in order to achieve the progress and quality of the part of the works being technically required/ continued with the prior approval of the LIC of India at no extra cost.

Since the work of replacement of AHUs is to be carried out in functional/working office, so the contractor has to arrange for necessary shutdown at respective floors in liaison with the tenants /users. All work during the planned shutdown period shall be completed within the scheduled shutdown period without causing major hindrance to the functioning of the user office/tenant. All the above factors have to be accounted for during quoting the rates and no hindrance on account of lack of liaison on part of the contractor for obtaining shutdown shall be considered.

7. SAFETY OF ADJACENT STRUCTURES AND CARE OF THE BUILDING

Care shall be taken by the contractor during execution of the work to avoid damage to the building. He shall be responsible for repairing all such damages and restoring the same to the original finish at his cost. He shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.

The Contractor shall provide and erect to the approval of the LIC of India such supports as may be required to protect effectively all structures and protective guards to office premises which may be endangered by the execution of the works or otherwise take such permanent measures as may be required by the LIC of India.

8. TEMPORARY WORKS

Before any temporary works are commenced the Contractor shall submit at least 7 days in advance to the LIC of India for approval complete drawings of all temporary works such as dismantling of walls/existing structures etc. he may require for the execution of the works. The Contractor shall carry out the modifications relating to strength, if required by the LIC of India in accordance with the conditions of Contract at his own cost. The Contractor shall be solely responsible for the stability and safety of all temporary works and unfinished works and for the quality of the permanent works resulting from the arrangement eventually adopted for their execution.

9. TEMPORARY FENCING/ BARRICADING

The Contractor shall provide and maintain a suitable temporary fencing/ barricading and gates at his cost to adequately enclose all boundaries of the site for the protection of the public and for the proper execution and security of the work and in accordance with the requirement of the LIC of India and regulations of local authorities. These shall be altered, relocated and adopted from time to time as necessary and removed on completion of the work.

10. DISPOSAL OF REFUSE

The Contractor shall cart away all debris, refuse etc. arising from the work from the site and dispose the same beyond municipal limits at his own cost. It is the responsibility of the Contractor to obtain permission/approval from the local authorities concerned to the effect that all rubbish arising out of Contractor's activities at the construction site or any other off-site activities borrow pits has been properly disposed off.

11. SAFETY CODE

- a) First aid appliances including adequate supply of sterilized dressing and cotton wool shall be kept in a readily accessible place.
- b) An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
- c) Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from the ground.
- d) No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm. (clear) and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding ladder.
- e) The excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.
- f) Every opening in the floor of a building or in a working platform is provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.
- g) No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
- h) Workers employed on mixing and handling material such as asphalt, cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand-gloves.
- i) Those engaged in welding works shall be provided with welder's protective eye shields and gloves.
- j) Overalls shall be supplied by the Contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.
- k) Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.
- l) The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

12. TECHNICAL AUDIT CLAUSE

The work is liable to be technically audited by the Chief Technical Examiner of the Central Vigilance Commission of the Government of India from time to time. Any defects, improvements or testing etc. pointed out by the Chief Technical Examiner should be carried out by the Contractor at his own cost and any deduction suggested by the CTE will be effected.

The Employer shall have a right to cause a technical examination and audit of works and the final bills of the Contractor including all supporting vouchers, abstract, etc. to be made at the time of payment of the final bill. If as a result of this examination or otherwise any sum is found to have been overpaid in respect of any work done by the Contractor under the Contract the Contractor shall be liable to return the amount of over payment and it will be lawful for the employer to recover the same from any sum or due to him and in any other manner legally permissible and if it is found, that the Contractor was paid less than what was due to him under the Contract in respect of any work, executed by him under the Contract the amount of such under payment shall be duly paid by the Employer.

Any sum of money due and payable to the Contractor (including Security deposit returnable to him) under this Contract may be appropriated by the Employer and set off against any claim of the Employer for the payment of a sum of money arising out of or under any other Contract made by the Contractor with the Employer.

13. WORKS TO BE DONE BY THE CONTRACTOR

Unless otherwise mentioned in the tender documents, the following works shall be done by the contractor and therefore, their cost shall be deemed to be included in their tendered cost- whether specifically indicated in the schedule of work or not: -

- (a) Foundations for equipments including foundation bolts and vibration isolation spring/pads,
- (b) Suspenders, brackets and floor/ wall supports for suspending/supporting ducts and pipes.
- (c) Suspenders and/or cable trays for laying the cables,
- (d) Excavation and refilling of trenches in soil wherever the pipes are to be laid directly in ground, including necessary base treatment and supports.
- (e) Sealing of all floor slab/wall openings provided by the LIC or made by the contractor for pipes and cables, from fire safety point of view, after laying of the same.
- (f) Painting of all exposed metal surfaces of equipments and components with appropriate colour as per specifications.
- (g) Making openings in the walls/ floors/ slabs or modification in the existing openings wherever provided for carrying pipe line, cables etc.
- (h) Providing wooden/metallic frames for fixing grills/ diffusers.
- (i) Making good all damages caused to the structure during installation and restoring the same to their original finish.

14. MACHINERY FOR ERECTION

All tools and tackles required for dismantling and removal of existing equipments from site, unloading / handling of new equipments and materials at site, their assembly,

erection, testing and commissioning shall be the responsibility of the contractor at no extra cost.

15. COMPLETENESS OF THE TENDER

All sundry equipments, fittings, assemblies, accessories, hardware items, foundation bolts, supports, termination lugs for electrical connections, cable glands, junction boxes and all other items which are useful and necessary for proper assembly and efficient working of the various equipments and components of the work shall be deemed to have been included in the tender, irrespective of the fact whether such items are specifically mentioned in the tender or not.

16. DISPATCH OF MATERIALS TO THE SITE AND THEIR SAFE CUSTODY

The contractor shall dispatch the material to the site in consultation with the LIC of India. Suitable storage for materials shall be made available free of charge temporarily. Watch and ward however, shall be responsibility of the contractor. Program of dispatch of material shall be framed keeping in view the progress of the work. Safe custody of all machinery and equipment supplied by the contractor shall be the responsibility of the contractor till final taking over by the Consortium of Tenants of Jeevan Bharti Building.

17. CO-ORDINATION WITH OTHER AGENCIES

The contractor shall co-ordinate with all other agencies involved in the work so that the work of other agencies is not hampered due to delay in his work.

18. QUALITY OF MATERIALS AND WORKMANSHIP

- (a) The components of the installation shall be of such design so as to satisfactorily function under all conditions of operation and maintenance of the system.
- (b) The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.
- (c) All equipments and materials to be used in work shall be manufactured in factories of good repute having excellent track record of quality manufacturing, performance and proper after sales service.

19. SAFETY MEASURES

All equipments shall incorporate suitable safety provisions to ensure safety of the operating personnel at all times. The initial and final inspection reports shall bring out explicitly the safety provisions incorporated in each equipment.

20. INSPECTION AND TESTING

Initial inspection of materials and equipments at manufacturer's works may be done by the Engineer-in-Charge or his representative. For item equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipments at the manufacturer's works before dispatch. The contractor shall give sufficient advance notice regarding the dates proposed for such tests' to the department's representative(s) to facilitate his presence during testing. The Engineer-in-charge at his discretion may witness such testing. Equipments will be inspected at the manufacturer/ authorized dealer's premises, before dispatch to the site by the contractor.

No additional payment shall be made to the contractor for initial inspection/testing at the manufacturer's works by the representative of the LIC.

21. GUARANTEE

- (a) The contractor shall guarantee the complete system to provide the specified flow and pressure under all conditions and outlets.
- (b) All equipments shall be guaranteed for a period of 12 months from the date of acceptance and taking over of the installation by LIC against unsatisfactory performance and/or breakdown due to defective design, material, manufacture, workmanship or installation. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Corporation's Engineer. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Chief Engineer in this regard shall be final.

22. DRAWINGS FOR APPROVAL ON AWARD OF WORK

The contractor shall prepare and submit three sets of following drawings and get them approved from the LIC before the start of the work. The approval of drawings however does not absolve the contractor of his responsibility to supply the equipments/ materials as per agreement. In case of any contradiction between the approved drawings and agreement the decision of the Chief Engineer shall be final and binding on the contractor.

- (a) Layout drawings of the equipments to be installed in various AHU rooms.
- (b) Drawings including section, showing the details of erection of entire equipments including their foundations.
- (c) Plumbing drawings showing the layout of entire piping, dia and length of pipes, valves and isometric drawings showing connections to various equipments.
- (d) Ducting drawing showing sizes, location of dampers, grilles and diffusers.
- (e) Electrical wiring diagrams for all electrical equipments and controls including the sizes and capacities of the various cables and equipments,
- (f) Dimensioned drawings of all electrical and control panels,
- (g) Drawings showing the details of all insulations and related works.
- (h) Drawings showing details of supports for pipes, cable trays etc.
- (i) Any other drawings relevant to the work.

23. COMPLETION DRAWINGS

Three sets of the following laminated drawings shall be submitted by the contractor while handing over the installation to the Department. Out of this one of the sets shall be laminated on a hard base for display in the AC Plant Room. In addition one set will be given on compact disc.

- (a) Plant installation drawings giving complete details of all the equipments, including their foundation.

- (b) AHU room installation drawings.
- (c) Plumbing layout drawings including insulation giving sizes and lengths of all the pipes and the sizes and locations of all types of valves, and including isometric drawings for the entire piping including the pipe connections to the various equipments and insulation details where ever required.
- (d) Duct layout drawings with their sizes and locations of all grills, dampers and diffusers.
- (e) Line diagram and layout of all electrical control panels giving switchgear ratings and their disposition, cable feeder sizes and their layout,
- (f) Control wiring drawings with all control components and sequence of operations to explain the operation of control circuits,

24. AFTER SALES SERVICES

The contractor shall ensure adequate and prompt after sales service in the form of maintenance, spares and personnel as and when required and shall minimize the breakdown period. In case of the equipment supplied by other manufacturers the firm shall furnish a guarantee from the manufacturer for the same before the plant is taken over.

25. DOCUMENTS TO'BE FURNISHED ON COMPLETION OF INSTALLATION

Three sets of the following documents shall be furnished to the LIC by the contractor on completion of work:-

- (a) Completion drawings as per Para 22
- (b) 3 sets of manufacturer's technical catalogues of all equipments and accessories.
- (c) Operation and maintenance manual of all major equipments, detailing all adjustments, operation and maintenance procedure.
- (d) Test Reports/Certificates of all AHU's.

26. E-Measurements.

The measurements will be recorded in EXCEL format (Annexure A1) by the Construction Associate at the site as works progress. The description of the items is to be imported in totality from the approved protected soft file (Excel File) of BOQ in the tender.

Any extra/ deviated work executed during the period will also be measured in EXCEL format after following all laid down processes.

The EXCEL sheet Measurement will be submitted by the Construction Associate to the LIC Site Engineer in both hard and soft format. The measurement then will be checked 100% by LIC Site Engineer and if required, the same shall be corrected by LIC Site Engineer to establish that the measurements so given by the Construction Associate is in order and complete in all respects.

Abstract of Bill (Annexure B) in EXCEL and PDF will be submitted by Construction Associate. The Construction Associate on receipt of the corrected Hard Copy of Abstract of Bill from LIC will prepare their Tax Invoice on their letter head and submit to LIC of India for further processing of their Bill for release of payment. The Tax Invoice will have zero correction.



Chief Engineer's Office, New Delhi

AHU Replacement, Jeevan Bharti Bldg.

Annexure A1

E-MEASUREMENT SHEET								
BILL NO.								
i	NAME OF WORK							
ii	AGREEMENT NO. & DATE/ CONTRACT REF.							
iii	NAME OF CONSTRUCTION ASSOCIATE & ADDRESS							
iv	NAME & DESIGNATION OF LIC MEASURER WITH S.R. NO.							
v	PERIOD OF MEASUREMENT							
vi	NAME OF CONSTRUCTION ASSOCIATES AUTHORIZED REPRESENTATIVE/ENGINEER ATTENDING MEASUREMENT. AUTHORIZATION LETTER REF:							
Item No.	Description of item	Unit	No.	Length	Breadth	D/H	Qty.	Remark/Note

Signature of Construction Associate's Engineer

(Name)

Signature of LIC Site Engineer

(Name & SR No.)

Signature of LIC Test Checking Engineer

(Name & SR No.)

Annexure-B

ABSTRACT SHEET									
A/C RA BILL...../FINAL BILL									
i	NAME OF WORK								
ii	AGREEMENT NO. & DATE/ CONTRACT REF.								
iii	CONTRACT AMOUNT								
iv	NAME OF CONSTRUCTION ASSOCIATE & ADDRESS								
v	NAME & DESIGNATION OF LIC MEASURER WITH S.R. NO.								
vi	PERIOD OF MEASUREMENT								
vii	NAME OF CONSTRUCTION ASSOCIATES AUTHORIZED REPRESENTATIVE/ENGINEER ATTENDING MEASUREMENT. AUTHORIZATION LETTER REF:								
viii	DATE OF SUBMISSION								
S.No.	T.Item No.	Description of item	Unit	Tender Qty.	Qty. up to Previous Bill	Qty. in this Bill	Cumulative Total	Rate (in Rs.)	Amount (in Rs.)
1	2	3	4	5	6	7	8=(6)+(7)	9	10=(8)x(9)

Note: For any inadvertent deviations in Item Description, unit or Rate after importing the file, the original document will prevail upon.

Authorized Signatory of Construction Associate

Name & designation

CERTIFIED

That the rates are quoted in the PRICE BID after actually visiting site of work and acquainting with the nature of work & working conditions.

That we have carefully studied the conditions of contract and specifications for material and workmanship in the Part-I and will adhere to the same.

.....

**SIGNATURE OF CONTRACTOR
WITH OFFICE SEAL & DATE**

SCHEDULE OF QUANTITIES

A: SCHEDULE FOR SITC

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
1	Supply, Installation, Testing and commissioning of factory built floor mounted chilled water double skin type horizontal/ vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as required, minimum 2 bend GSS/ PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air pre filters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for $415 \pm 10\%$ volts, 50Hz, 3 Phase AC supply suitably designed for static pressure 65 mm Wg, variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, necessary vibration isolation arrangement etc. complete as per specification and of following capacities.				
a)	Double skin AHU Units of 6 row cooling coil of minimum 17000 CFM	2	Set		
b)	Double Skin AHU Units of 6 row cooling coil of minimum 23000 CFM	1	Set		
c)	Double Skin AHU Units of 6 row cooling coil of minimum 33000 CFM	23	Set		

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
2	Supply, installation, testing & commissioning of AHU starter Panel: 'VFD provision' with bypass STAR/DELTA STARTER with Overload, Single phasing, Under voltage and overvoltage, phase reverse protection with necessary internal wiring. Starter should be compatible for BMS also with necessary inputs and outputs provisions, power and control wiring should be carried out as per IS standards suitable for operation on 415 Volt, 50 Hz, 3 Phase AC supply complete with interconnections for above AHU's.	26	No.		
3	Supply & laying /fixing of 4C 10 Sq.mm. XLPE insulated Copper conductor armoured cable of 1.1 kV grade of following size on wall surface/ existing tray as required.	650	RM		
4	Supply and making end termination with brass compression gland and lugs for above 4 C 10 Sq.mm Cu. Conductor armoured cable complete as required.	52	Each		
5	Supply & laying /fixing of 6 C 1.5 Sq.mm. PVC insulated Copper conductor armoured control cable of 1.1 kV grade of following size on wall surface/ existing tray complete with end terminations complete as required.	650	RM		
6	Supplying, fixing acoustic lining on wall and ceiling of AHU rooms with 50mm thick, density 32 kg/cu.m resin bonded glass fiber insulation friction fixed in 610mm x 610 mm frame work made of 25X50X50X50X25 mm made out of 0.6mm thick GI sheet U shaped channel and covered with reinforced fiber glass tissue and finished with 0.80 mm perforated aluminium sheet etc. complete as required and as per specifications. 50 mm thick resin bonded glass wool having density of 32 kg/m³	2170	Sq. Mtr		

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
7	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping plumbing inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with fire retardant quality expanded polystyrene moulded pipe section of density 20 kg/cu.m after a thick coat of cold setting adhesive (CPRX compound) wrapping with 500g polythene faced hessain and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing felt strip(as per IS:1322 as amended up to date) at joints repairing of damage to building etc. as per specifications and as required complete in all respect.				
	Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS:3589, from minimum 6.35mm thick M.S. Sheet for pipes up to 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.				
a)	Chilled water piping of nominal size - 50 mm dia. (32 mm thick fiber glass insulation)- FOR DRAIN	130	RM		
b)	Chilled water piping of nominal size - 80 mm dia. (50mm thick expanded polystyrene)	45	RM		
c)	Chilled water piping of nominal size - 100 mm dia. (50mm thick expanded polystyrene)	345	RM		
8	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications.				
a)	100 mm BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O ring PN 16 pressure rating for chilled water/hot eater circulation as specified	46	Each		

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
b)	80 mm BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O ring PN 16 pressure rating for chilled water/hot water circulation as specified	6	Each		
c)	BALANCING VALVE WITH BUILT IN MEASURING FACILITY 100 mm dia	23	Each		
d)	BALANCING VALVE WITH BUILT IN MEASURING FACILITY 80 mm dia	3	Each		
e)	Y - STRAINER of 100 mm dia	23	Each		
f)	Y - STRAINER of 80 mm dia	3	Each		
9.a	Supply, Installation, Testing and Commissioning of 80 mm dia. sizes electronic, self balancing, pressure independent type dynamic balancing valve with integrated 2 way modulating control valves in a single body. The actuator shall be capable of accepting up to 10V DC and up to 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for up to 50 mm valves and not be less than 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar minimum. Rates are inclusive of necessary interconnections for fixing valve in 100 mm dia. MS pipe line along with necessary fittings, fixtures, reducers complete as required and directed.	23	Each		
9.b	Supply, Installation, Testing and Commissioning of 80 mm dia. sizes electronic, self balancing, pressure independent type dynamic balancing valve with integrated 2 way modulating control valves in a single body. The actuator shall be capable of accepting up to 10V DC and up to 20mA electric signal and shall provide similar transducer feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for up to 50 mm valves and not be less than 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar minimum.	3	Each		

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
10	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular / round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of 18 gauge sheet thickness complete as required.	910	Sq. Mtr		
11	Supply and fixing of acoustic lining of supply air duct and plenum with 25 mm thick resin bonded glass wool having density of 32 kg/m ³ , with 25 mm X 25 mm GI section of 1.25 mm thick, at 600 mm centre to centre covered with Reinforced Plastic tissue paper and 0.5 mm thick perforated aluminum sheet fixed to inside surface of ducts with cadmium plated nuts, bolts, stick pins, CPRX compound etc. complete as required and as per specifications.	890	Sq. Mtr		
12	Supplying and fixing 50 mm thick aluminum foil faced resin bonded fibre glass insulation (on duct) of density 24 kg/cu.m or mineral wool insulation of density 44 kg/cu m after applying two coats of cold setting adhesive (CPRX compound) sealing all joints with self adhesive aluminium tape & covering with 0.63mmx19mm GI wire mesh netting butting all joints and laced with GI wire complete as per specifications and as required. (for indoor applications).	20	Sq. Mtr		
13. a)	Supply, installation, testing and commissioning of Motorized (ON - OFF Type) duct mounted GI volume control damper with enthalpy sensor and necessary control wire (minimum 1.5 sq.mm) for integration within AHU room	26	Each		
13.b)	Supply, installation, testing and commissioning of Motorized (ON - OFF Type) duct mounted GI volume control Actuator with enthalpy sensor and necessary control wire (minimum 1.5 sq.mm) for integration within AHU room	26	Each		

S. No.	Description	Qty	Unit	Rate (in Rs.)	Amount (in Rs.)
14	Supplying, Fixing, testing and commissioning of fire dampers in supply air duct/ main branch and return air path as and where required of required sizes i/c control wiring, the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications.	39	Sq. Mtr		
15	Providing and fixing 63Amp TP&N disconnect fuse switch unit inside the existing panel board with ISI marked HRC fuses including drilling holes in cubicle panel, making connections, etc. as required.	5	Each		
16	Supply and making end termination with brass compression gland and lugs for above 4 C 25 Sq.mm Al. Conductor armoured cable completes as required.	10	Each		
17	Supply & laying /fixing of 4C 25 Sq.mm. XLPE insulated Al. conductor armoured cable of 1.1 kV grade of following size on wall surface/ existing tray as required. (Provisional)	10	RM		
TOTAL OF SCHEDULE-A (SITC) in Rs. =					

B. BUY BACK OF OLD ITEMS (FIXED RATES)

S. No.	Description	Qty	Unit	Rate	Amount
	Salvage value for taking away old AHU's, Electrical Starter Panels, Pipes including valves and other fittings, Ducting, insulation etc including dismantling/ cutting and transporting away from the site complete as required on as is where is basis.				
1	AHU's of Following Capacity 6 Coil Type with MS Header				
a)	33000 CFM	23	No.	64305.00	1479015.00
b)	23000 CFM	1	No.	41883.00	41883.00
c)	17000 CFM	2	No.	32975.00	65950.00
2	Old Electrical Panel/Pipes & accessories/ Ducting/ Insulation etc. on one AHU Room	26	LOT	14500.00	377000.00
	TOTAL OF SCHEDULE B (SALVAGE VALUE) TO BE PAID TO LIC OF INDIA (in Rs.) =				1963848.00