



## APPENDIX SHOWING IMPORTANT SCHEDULES

1. COMMENCEMENT OF WORK : Within ten days of the issue of letter of intent/order.
2. PERIOD OF COMPLETION : Sixty (60) Days.
3. LIQUIDATED DAMAGES : Rs. 1000/- per day subject to the max of 10% of the Accepted Contract sum.
4. PERIOD AND VALUE OF RUNNING/ON ACCOUNT BILL : Fifteen days, minimum 7 lac.
6. TOTAL RETENTION AMOUNT : 10% of cost of works executed + EMD.
7. REFUND OF RETENTION MONEY : To be refunded to the Contractor Thirty days after the end of Defects Liability period.
8. INCOME TAX DEDUCTION : At prevailing rate from each bill
9. DEFECTS LIABILITY PERIOD : Six months from the date of completion.
10. PERIOD OF FINAL MEASUREMENT : Fifteen days after virtual completion of work.
11. DEVIATION LIMIT OF THE QUANTITIES : >20% off scheduled quantities
12. REFUND OF EMD : Acceptance of final bill submitted by the Contractor

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### FINANCIAL BID (separately given)

Schedule of Quantities and Drawings& List of approved materials.

## SECTION - I INVITATION TO TENDERERS

- 1.1 Sealed tenders in two bid system are invited from established experienced contractors by the Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Rajendra Path, Pirmohani, Kadamkuan, Patna-800003.

S.No.	Name of Work	Estimated Value of Work (Rs.)	Time of Completion
1.	<b>Renovation work including Air-Conditioning (HVAC), Electricals, &amp; Interior Furnishing works at Regional Office, Rajendra Path, Pirmuhani Chauk, Kadamkuan, Patna-800003.</b>	<b>21.44 Lakhs</b>	<b>60 Days</b>

21.4

- 1.2 The intending contractors may collect the tender documents from the office of Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Pirmohani, Kadamkuan, Patna-800003, on payment of Rs. 1180/- in form of Demand Draft from a bank In favour of "THE ORIENTAL INSURANCE COMPANY. Ltd." Payable at Patna' from 22.01.2019 to 15.02.2019 between **10:00** hrs to **15:00** hrs. and shall be received back on or before 15.02.2019 before **15:30** hrs. If the tender document is downloaded from the web site then the demand draft of Rs.1180/- shall be attached with tender document.

- 1.3 Tenders are invited into two bid system i.e. "Technical bid" and "Financial bid" The intending contractors should submit the following details in the technical bid duly contained in closed sealed envelope no. 1 superscripted as "**Technical bid**":

- Organisational setup
- Proof of financial capability (proof from bankers for execution of the projects within a period of Sixty days)
- Copy of Permanent account number (PAN)
- Copy of registration from respective government agencies.
- Average Annual financial turnover, balance sheet duly certified by the chartered accountant shall be submitted during the last 3 years, ending 31<sup>st</sup> March of the previous financial year, The turnover should be at least 30% of the estimated cost of the proposed project.
- Proof of successfully completing One project costing not less than Rs.17.6 lacs OR minimum two similar projects each costing not less than Rs. 11 lacs or OR minimum three similar projects each costing not less than Rs. 8.8 lacs in last Five financial years i.e. for the period 2013-14, and up to last date of submission of the tender for the current financial year 2018-19, with complete details, name, address & phone nos. of clients etc.
- Details of projects in hand with name of clients, addresses & phone nos.,
- Earnest money of **Rs. 21,440.00 (Rupees Twenty One Thousand Four Hundred and Forty only)** in the form of Demand Draft from a bank in favour of "**The Oriental Insurance Company Ltd**", payable at Patna.

The Earnest Money will be refunded without any interest to all the unsuccessful tenderers after the award of the work subject to the relevant provisions in the tender documents. Any false information furnished by the contractor shall lead to the forfeiture of the earnest money.

- 1.4 The "Financial bid" shall be contained in a closed sealed envelope no. 2 superscribed as "**financial bid**". The financial bid shall contain **Section-VI (of)** duly filled in by the intending tenderers. This shall form the part of the agreement.

- 1.5 Both the sealed envelopes of “Technical bid” and “financial bid” should be kept in envelope no. 3 sealed and super scribed with the name of work on the top of envelope shall be deposited in the office of the Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Pirmohani, Kadamkuan, Patna-800001, on or before 15.02.2019 Before **15:30** hrs. The tender received in any manner other than prescribed above shall be summarily rejected. The company will not accept any responsibility for the tender lost in transit. The tenderer’s are asked to visit, inspect / Carefully the site. The Copies of the set of detail drawings can also be seen at the Regional Office of The OICL.
- 1.6 At first instance technical bid shall be opened on 15.02.2019, **16:00** hrs. The technical bid will then be evaluated on the basis of documents/information furnished as also if necessary, after physical examination of the tenderers office/workshop & projects successfully executed by them. The criteria followed by the company will be at its sole discretion and will not be open to question. The contractors who shall qualify in the technical bid will only be eligible for the opening of their financial bid.
- 1.7 Date of commencement of the work shall be reckoned from the 10th day of award of work.
- 1.8 The work as detailed in this tender shall be executed and completed in all respects in accordance with the Tender documents, which includes instructions to tenderers, General conditions of contract, special conditions of contract, schedule of Quantities, list of approved materials and Drawings to complete satisfaction of the Architects and the Employer.
- 1.9 Rates must be quoted for complete work at site inclusive of all costs, taxes and charges etc. All taxes and duties including GST on work contract. ESI charges etc. as applicable at Patna on the date of receipt of tender, Octroi, Royalties etc. on works and materials required for use in the execution of this project shall be entirely borne and payable by the Contractor and the Employer will not entertain any claim what so ever in this respect.
- 1.10 The tender for the works shall remain open for acceptance for a period of 60 days from the date of opening of tenders. If any Tenderer withdraws his tender before the said period or makes any modifications in terms & conditions of the tender which are not acceptable by the company, then the company, shall without prejudice to any other right or remedy, be at liberty to forfeit 100% of the earnest money as aforesaid.
- 1.11 **Total Security Deposited during execution of work shall comprise of**
- (a) Earnest Money Deposit
  - (b) Retention Money
- 1.12 **Retention Money**  
The retention money (i.e. deduction from interim & final bill shall be 10% of the gross value of each. The retention money & earnest money shall form the total security deposit during execution of work. The retention amount will be refunded to the contractor after the end of Defect Liability Period provided he has satisfactorily carried out all the works and attended to all defects in accordance with the condition of contract. No interest is allowed on retention money & earnest money. Earnest money shall be refunded after the submission and acceptance of final bill.
- 1.13 Earnest money of the successful tenderer is liable to be forfeited in the event of refusal or delay on his part in signing the agreement or starting the work as mentioned in the tender and employer will be at liberty to award it to another contractor.

- 1.14 The competent authority on behalf of the Regional Manager, The Oriental Insurance Company Ltd.,Regional Office, Pirmohani, Kadamkuan, Patna-800003, reserves to himself the right of accepting the whole or part of the tender and the tenderer shall be bound to perform the same at the rate quoted.
- 1.15 Canvassing whether directly or indirectly in connection with the tender is strictly prohibited and the tenders submitted by the contractors who resort to canvassing in any form would be liable to rejection.
- 1.16 The tendering firms, in case the tenderer is a partnership firm, shall submit the tender signed by the partners. In the event of absence of any partner, it must be signed on his behalf by a person holding power of attorney which shall be attached along with the tender and it must also disclose that the contractor is duly registered under the Indian partnership Act or not.
- 1.17 The notice inviting tender shall form part of the contract document. The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority, shall within 10 days from the stipulated date of start of work sign the contract consisting of :
- a) The notice inviting tender, all the documents including additional conditions, invitation of tender and acceptance thereof together with any correspondence leading there to.
  - b) Offer in standard tender form.
- 1.18 The tenderer shall unconditionally accept terms & conditions of the company. Conditional offer shall be summarily rejected.
- 1.19 The employer reserves the right to accept or reject any tender without assigning any reason whatsoever.

**REGIONAL MANAGER**

**For THE ORIENTAL INSURANCE COMPANY LTD.  
Regional Office, Pirmohani, Kadamkuan, Patna-800001**

**STANDARD TENDER OFFER**

**THE ORIENTAL INSURANCE COMPANY. LTD., REGIONAL OFFICE,  
PIRMOHANI, KADAMKUAN, PATNA-800001,**

**Item Rate Tender & Contract for Works**

**Tender for Renovation Works Oriental Insurance Company Limited, Regional Office,  
Pirmohani, Kadamkuan, Patna-800001.**

- . Including Electrical Works, Interior Furnishing Work, HVAC.

To be submitted by ..... between ..... hrs. to ..... hrs.

Issued to: .....

Signature of the person issuing the documents.....

Designation: .....

Date of Issue: .....

**TENDER**

I/We have read and examined the notice inviting tender, Schedule, specifications applicable, Drawings & Designs, General rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Quantities & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Pirmohani, Kadamkuan, Patna-800001, within the time specified in schedule, viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in General Rules and Directions and the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender open for Sixty days (60 days) from the due date of submission thereof and not to make any modifications in its terms and conditions.

A sum of Rs. 21,440/- (Rupees Twenty One Thousand Four Hundred and Forty only) is hereby forwarded in the form of Demand Draft of a Bank as earnest money. If I/we, fail to commence the work specified I/we agree that the said Regional Manager, The Oriental Insurance Company Ltd. Regional Office, Pirmohani, Kadamkuan, Patna, or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage 20% mentioned in the schedule and those in excess of that limit at the prevailing market rates/tendered rates whichever is lower of the two and shall be determined in accordance with the provision contained in the tender form.

I/We hereby declare that I/we shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/we am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of The Oriental Insurance Company Ltd.

I/We agree that should I/we fail to commence the work specified in the above memorandum, an amount equal to the amount of the earnest money mentioned in the form of invitation of tender shall be absolutely forfeited to the Regional Manager, The Oriental Insurance Company Ltd. Regional Office, Pirmohani, Kadamkuan, Patna, and the same may at the option of the competent authority on behalf of the Regional Manager, The Oriental Insurance Company Ltd. Regional Office, Pirmohani, Kadamkuan, Patna, be recovered without prejudice to any other right or remedy available in law out of the deposit in so far as the same may extend in terms of the said bond and in the event of deficiency out of any other money due to me/us under this contract or otherwise.

Dated.....

**Sign. of Contractor**  
Postal Address

**Witness:**

Address:

Occupation:

**ACCEPTANCE**

The above tender (as mentioned by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Pirmohani, Kadamkuan, Patna, for a sum of Rs.

.....

(Rupees.....  
.....)

The letters referred to below shall form part of this contract Agreement:

- a)
- b)
- c)

**for & on behalf of the Regional Manager, The Oriental Insurance Company Ltd.  
Regional Office, Pirmohani, Kadamkuan, Patna-800003.**

Dated ..... Signature/Designation.....

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## SECTION-2: INSTRUCTION TO TENDERERS

2.1 The tenderer shall examine carefully all the tender documents consisting of:

### TECHNICAL BID

Section - I	Invitation to Tenderers
Section - II	Instructions to Tenderers
Section - III	General Conditions of Contract
Section - IV	<b>Special Conditions of Contract</b>

### FINANCIAL BID (separately given)

Schedule of Quantities and Drawings & List of approved materials

These shall form part of the agreement.

The tenderer is advised to visit and inspect the site at his own cost and responsibility and to secure all necessary information which may be required for completing the tender. Ignorance of site conditions or local information shall not be considered as an excuse for non-performance of the contract. All costs, charges and expenses that may be incurred by the tenderer in connection with the preparation of his tender shall be borne by him and the Employer/Architect does not accept any liability whatsoever in this regard.

- 2.2 Time is the essence of the contract and the tenderers are required to complete the work in all respects within the stipulated time of completion and hand over the same, complete in all respects to the satisfaction of the Architects/Employer.
- 2.3 The tender should contain not only the rates but also the value of each item of work entered in the prescribed column of the BOQ and all the items should be totalled up in order to show the aggregate value of the entire tender. The rates quoted by the tenderer should be expressed accurately both in words and figures so that there is not discrepancy. All corrections in the tender shall be duly attested by initials of the tenderers. Corrections if not attested, may entail rejection of tender. The rates quoted by the tenderers in item rate tender will be the basis (and not the amounts in case of discrepancies) in finalising the tender.
- 2.4 It shall be clearly understood that the rates quoted in the tender are to be for complete work at site as per instructions to tenderers, conditions of contract, special conditions of contract specifications and drawings, addenda referred to therein and also for all such works as are necessary for the proper completion of the contract. Although specific mention thereof may not have been made in the specifications or in drawings or in tender documents. The rates shall be firm and shall not be subject to cost escalation on account of labour and material and labour conditions or any other reason whatsoever.

- 2.5 The tenderers shall use only the form issued with this tender to fill up the rates.
- 2.6 Every page of the tender shall be signed on the bottom of right hand side and any tender not so completed is liable to be treated as defective and liable to be rejected.
- 2.7 The successful tenderer will be notified about the acceptance of his tender by the employer and he will execute agreement within 10 (ten) days thereof, failing which his tender would be liable to rejection with forfeiture of the Earnest Money and the employer would be at Liberty to award it to another tenderer.
- 2.8 The contract will be governed by the Indian Contract Act, Indian Sale of goods Act and all other relevant laws. All payments due to the contractor under the contract will be made in Indian Rupees Currency.
- 2.9 The rates quoted shall be for complete work at site and should be inclusive of incidentals expenses necessary for carrying out the work. The rates shall be inclusive of all Taxes applicable at Patna for or any other tax or duty levied by any Government or Public bodies. The rates shall be firm and shall not be subject to cost escalation of labour and material and exchange variations, labour conditions or any other conditions whatsoever.
- 2.10 A schedule of approximate quantities for various items accompanies this tender. It shall be clearly understood that neither the architect nor the employer accept any responsibility for the correctness or completeness of this schedule in respect of items and quantities and this schedule is liable to alterations by omission, deduction or additions at the discretion of the employer in consultation with the architect without violating the terms of the contract.
- 2.11 The employer does not bind itself to accept the lowest or any tender or to assign any reason thereof and also reserves the right of accepting the whole or part of the tender. The part acceptance will not violate the terms and conditions of the contract and will execute the work at the specified rates without any extra charges or compensation.
- 2.12 Tax deductions will be made as per the prevailing rates from the contractors on account bills.

## SECTION III - GENERAL CONDITIONS OF THE CONTRACT

### 3.1.0 DIRECTIONS REGARDING PROCEDURES

In construing these conditions, specifications and Contract Agreement, the following words shall have the meaning here in assigned to them except where the subject or context otherwise requires:

- (a) "Employer" Shall mean **"The Oriental Insurance Company Ltd."** having its Regional Office at Pirmohani, Kadamkuan, Patna-800003, Shall include authorized representative/s assign/s or successor/s. Shall mean **"The Oriental Insurance Company Ltd."** having its Regional Office at Pirmohani, Kadamkuan, Patna-800003, Shall include authorized representative/s assign/s or successor/s.
- (b) "Contractor/Builder" Shall mean the individual or firm or company, whether incorporated or not, undertaking the work and shall include legal personal representatives of such individual or the persons comprising such firm or company or the successors of such individual or firm or company and the permitted assignee of such individual or such individual or firm or company.
- (c) "Architect" Shall mean the said whose registered office is situated at **"IDEATION DESIGN STUDIO PVT LTD "**, Address : 1st Floor, Shambhu Nath Plaza, New Dakbunglow Road, Patna-800001. (and shall include his authorized representative) or in the event of his death or termination of his services by the Employer in his sole and unqualified discretion, such other person/persons as shall be provided always that no person subsequently appointed to be Architect under this contract shall be entitled to disregard or over rule any previous decision or direction given or expressed by the Architect specified here in unless otherwise approved by the Employer.
- (d) "Project Manager" Shall mean the accredited representative of the Employer and shall be over all in-charge of the work. He shall administer the contract as per contract Agreement conditions. Shall mean the accredited representative of the Employer and shall be over all in-charge of the work. He shall administer the contract as per contract Agreement conditions.

- (e) "Contract" Means the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority on behalf of the Regional Manager, The Oriental Insurance Company Ltd., Regional Office, Pirmohani, Kadamkuan, Patna-800003, and the Contractor, together with the documents referred to therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by the Engineer-in-Charge and all these documents taken together, shall be deemed to form one contract and shall be complementary to one another.

In the contract, the following expressions shall, unless the context otherwise requires have the meanings, hereby respectively assigned to them:

- (i) The expression **works** or **work** shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.
- (ii) The **site** shall mean the land/or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street 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.
- (iii) **Schedule(s)** referred to in these conditions shall mean the relevant schedule(s).
- (iv) **Tendered Value** means the value of the entire work as stipulated in the letter of award of work.

### 3.1.1 General

The work shall be carried out strictly in accordance with the drawings amplified by the specifications of materials and workmanship given hereunder. The drawings and specifications shall be taken together and shall complement each other. In case of any discrepancy, the following order of preference shall be followed:

- (a) Particular Specifications.
- (b) Drawings.
- (c) CPWD Specifications & Latest DSR on date of Publication of the tender.
- (d) National Building Code and Relevant IS Provisions.

In case there are no specifications for items shown on the drawings or where items are not exhaustively described, the general specifications of CPWD shall be followed for

which nothing extra shall be paid. However the specification should be got approved from the Architect before commencement of work.

### **3.1.2 Drawings and Specifications**

- (a) After signing the Contract, the contractor will be given free of charge three prints of all working drawings. The contractor shall make at his own expense any additional copies he requires. One copy of the drawing furnished to the contractor as aforesaid shall be kept by the contractor at site and the same shall, at all reasonable times be available for inspection and use by the Architect and his representatives any by any other person authorized by him in writing.
- (b) Such further drawings and instructions including revisions, as the Architect may furnish to the Contractor shall form part of this contract.
- (c) Only figured dimensions and detailed drawings shall be followed. The Contractor shall verify all dimensions in the field before any work is started and obtain instructions of the Architect in case of any discrepancy.
- (d) The Architect with approval of the project manager shall have power and authority to supply to the Contractor from time to time during the progress of the work, such further drawings and instructions as shall be necessary for the purpose of proper and adequate execution and maintenance of work and the Contractor shall carry out and be bound by the same.

### **3.1.3 Architects Status and Decisions**

- (a) Status:

The Architects shall have general supervision and direction of the work. He has authority on behalf of the Employer to stop the work whenever such stoppage may be necessary to ensure the proper execution of the work. The architect shall be the interpreter of the conditions of contract and the judge of its performance subject to the approval of the Project Manager.

- (b) Decisions:

The Architect shall, within a reasonable time, make decisions on all claims of the contractor and on all other matter relating to the execution & progress of the work or the interpretation of the contract documents. The decisions, opinion direction of the Architects with respect to all or any of the following matters shall be referred to the Project Manager and decision so taken shall be final & binding to the contractor.

- i) Variation or modifications of the design.
- ii) The quality or quantity of works or the additions/alterations or omissions or substitutions of any work.
- iii) Any discrepancy in the drawings or between the drawings and or specifications.
- iv) The removal and / or re-execution of any work by the contractor.
- v) The dismissal from the work of any persons employed therein.

- vi) The opening up for inspection of any work covered up.
  - vii) The amending the making good of any defects under defects liability period.
  - viii) Approval of materials and workmanship.
  - ix) The contractor to provide everything necessary for the proper execution of the work.
- (c) The authorities so conferred in the architect vide various clause above shall be subject to review of the Project Manager at any time whenever desired his decision shall binding under the contract.
- (d) The employer shall be at liberty to take over the project at any time get the work executed directly under the supervision of Project Manager. The power vested in the Architect under this tender shall automatically be vested in the Project Manager thereafter.
- (e) In the event of any dispute under this contract or between the Architect & the contractor, the speedier decision will be final in the matter. In case the contractor refer the matter to the Project Manager for speedier decision.
- (f) Dismissal:

The contractor shall on the report of the architects immediately dismiss from the works within 24 hours any person employed thereof by him, who may, in the opinion of Architects be incompetent or misconducts himself and such person shall not be re-employed on the works without the permission of the Architects.

### **3.2.1 Extent of Contract**

The contractor shall supply at his own cost all material implements, ladders, cordage, tackle, scaffolding and temporary works required for the proper execution of the work whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not and which may be necessary for the purpose of satisfying of conditions he is entitled to be satisfied which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply survey instruments and other materials necessary for the purpose of setting out works, and counting weighing and assisting to the measurement or examinations at the any time and from time to time of the work material, falling his so doing the same may be provided by the engineer-in-charge at the expense of the contractor and the expenses may be deducted from any money due to the contractor under the contract from his security deposit or the proceeds of sale thereof. The contractor shall also provide a sufficient portion of fencing and lights required to protect the public from accident, and shall be bound to bear the expenses of defence brought by any person for injury sustained owing to neglect of the above precautions and to pay any damage and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person. In no case, the employer shall be as a party to any such claim/claims and the contractor shall indemnify the employer against any claim for any person on this account.

### **3.2.2 Sufficiency of Tender**

The contractor shall be deemed to have satisfied himself before tendering to the correctness and sufficiency of his tender for the work and of his prices for the work and of his prices stated in the schedule, which shall, except in so far as it is otherwise provided in the contract, cover all his obligations under the contract and all matters and things necessary for the proper completion and maintenance of the work.

### **3.2.3 Assignment or Sub Letting of Contract**

The contractor shall not assign the contract or any part thereof or any benefit or interest therein or there under or any claim arising out of the contract to any other party without the prior written consent of the employer.

### **3.2.4 Power to make Alterations**

Architect shall have power to make any alterations or additions to the stipulated specifications, drawings, designs, and in striations that may appeal to him to be necessary or, advisable during the progress of the work and the contractor shall have no claim for compensation on account of such alterations or additions. The contractor shall be bound to carry out the work in accordance with any instructions which may be given to him in writing signed by the Architect and such alterations shall not invalidate the contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work and at the same rates as are specified in the tender for the main work. The time for the completion of the work shall be extended in the proportion that the additional work bears to the original contract work and the certificate of the Architect/Project Manager shall be conclusive as to such proportions.

### **3.3.0 WORKS SUBJECT TO APPROVAL OF ARCHITECT**

All works to be executed under the contract shall be subject to approval of the architect who shall be entitled to direct at what point or points and in what manner they are to be commenced and from time to time carried on.

#### **3.3.1 Contractors office and Stores**

All offices, sheds and stores required by the contractor shall be enacted at his own cost with the prior approval of the Project Manager or his representative and shall be dismantled and removed upon the completion of the work if so directed within 7 (seven) days of the issue of such intimation.

#### **3.3.2 Urgent Repairs and Urgent works**

If by reason of any accident or failure or other event occurring to or in connection with the work or any part thereof either during the execution of the work or during the period of Guarantee, any remedial or other work or repair shall in the opinion of Project Manager be urgently necessary for security and the contractor is unable or unwillingly at once to do such work or repair, the employer may on its own get the

work done/remedied/repared as the Resident Engineer may consider necessary. If the work or repair so done by the employer is such, which, in the opinion of the

Architect the contractor was liable to do at his own expense under the contract, all costs and changes incurred by the employer in doing so shall on demand be paid by the contractor to the employer or may be deducted by the employer from any money due or which may become due to the contract. Provided always that the resident engineer shall soon after the occurrence of any such emergency as may be reasonable notify the contractor thereof in writing.

### **3.4.0 DIRECTION FOR EXECUTION OF WORK**

#### **3.4.1 Setting outs**

The contractor shall be responsible for the true and proper setting out of the works in relation to the original points, lines and levels of reference given by the architect in writing and for correctness subject as above mentioned of all the positions, levels dimensions and alignments of all parts of the work and for the provision of all necessary instruments, appliances and labour in connection therewith. If at any time during the progress of the work any error shall appear or arises in any part of the work, the contractor on being required to do so by the Project Manager shall at once inform the architect or their representatives. The checking of the work by the architect/representative shall not in any way relieve the contractor from his responsibilities of carrying out the work as per the best practises of construction.

#### **3.4.2 Work to be to the satisfaction of the Architect**

The contractor shall execute, complete and guarantee the work in accordance with the contract to the satisfaction of the architect and shall comply with and adhere to their instructions & directions concerning the work.

#### **3.4.3 Engagement of Labour**

The contractor shall employ labour in sufficient numbers either directly or through subcontractors, where such sub letting is permitted to maintain the required rate of specified in the contract and to the satisfaction of the architect. The contractor shall not employ in connection with the works any person who has not completed his fifteen years of age.

- a. The contractor shall comply with the provisions of the payment of Wages Act, 1936; Minimum Wages Act, 1948; Act, 1947; Maternity Benefit Act, 1961 and Mines Act, 1938, Labour Contract (Regulations & Abolishing) Act or Rules, The Child Labour (Prohibition and Regulation) Act, 1986, or any modifications thereof or any other law relating thereto and rules made there under time to time.

The contractor shall indemnify the employer against any payment to be made under and for observance of the Regulation aforesaid without prejudice to his right to claim indemnify from his sub-contractors.

The contractor shall provide and maintain at his own expenses all rights, guards, fencing and watching when and where necessary or required by the Resident

Engineer for the protection of the works or for the safety and convenience of those employed on works or the public.

#### **3.4.4 Disruption of Progress**

The contractor shall give written notice to the Architect whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawings or order, including a direction, instruction or approval is issued by the Architect within a reasonable time. The notice shall include details of the drawing or order required and by when if is required and of any delay or disruption likely to be suffered if it is late.

If, by reason of any failure or inability of the Architect to issue within a time reasonable in all the circumstances any drawings or order requested by the contractor and the work suffers delay then the architects shall take such delay into account in determining any extension of time to which the contractor is entitled under provisions of contract hereof, however no other compensation will be admissible on this account.

#### **3.4.5 Rectification of Defects**

if, it shall appear to the Architect or his representative in-charge of the works that any work any has been executed with unsound, imperfect or un-skillful workmanship or material or any inferior description, the contractor shall, on demand, in writing from the Architect specifying the work material or articles complained of shall rectify or remove and reconstruction work so specified in part, as the case may require.

#### **3.4.6 Variation**

In case the quantity of any item of the work executed increases by more than 20% from the quantity given in the tender document, the rate of such item would be settled as under:

- a) Rate of the item worked out as per market rate
- b) Rate of the item quoted by the contractor.

The rate of such item would be lowest of the two rates mentioned above.

**3.4.7** The contractor shall submit the samples of various material for the approval of the Architect & Client. The contractor shall use the material only after the approval of the Architect/Client. The verification of the material shall be done on random base during the progress of the work in either the following manner:

- (a) Random samples would be picked up during execution of work from site & if decided by the Architect/client, it would be sent to one of the approved laboratories for test & quality check. The cost of such tests would be borne by the client.
- (b) The Architect/client may direct the contractor to submit the challan of delivery of the material brought at site. It would be on Random based. The Architect

may also direct the contractor to submit the copy of the test/verification certificate provided by the manufacturer of that particular material.

#### **3.4.8 Free Access to work site**

The contractor shall provide all necessary and reasonable facilities and free access to the works and his records at site of work to the Architects, Resident Engineer and their representatives. He shall provide facilities and space to the satisfaction of the Architect or his representative for inspection of any part of work.

#### **3.4.9 Inspection of work**

All work under or in course of execution or executed in pursuance of the contract shall at all times be open to inspection and supervision of the Architect or his representative and the contractor shall at all times with reasonable notice or the intention of the Architect or his representatives to visit work shall have been given to the contractor, either himself be present to receive orders and instructions, or have responsible agent duly accredited in writing present for that purpose. Orders to the contractor's agent shall be given to the contractor himself.

#### **3.4.10 Preparation of Construction Programme Schedule**

As and when sufficient planning information is available, the contractor in consultation with the Architect shall prepare a programme schedule of the activities. Contractor should prepare bar-charts & articles path method analysis of the light of the tendered quantities and their rates respectively. Under no circumstances shall this schedule be prepared later than one week of finalisation of contract. Throughout the work, all programmes, schedules and charts shall be revised wherever any significant change occurs. The contractor shall also submit weekly progress chart to the Architect.

#### **3.4.11 Site Order Book**

The contractor shall maintain a Site Order Book at the site of the works wherein the instructions of the architect/Project Manager or their representatives shall be reasoned. The site order book shall be the property of the employer and the instructions recorded therein shall be deemed to have the same force and effect as if they had been given to the contractor himself. The contractor or his representative on the site must sign the book in taken of his having persuade the orders given therein.

#### **3.4.12 Hindrance Register**

A Hindrance Register shall be maintained at the site of work wherein the contractor shall notify the items affected and the execution of work, the date on which the delay was cleared. These entries shall be initiated by the Project Manager/Architect as well.

#### **3.4.13 Suspension of Work**

The contractor shall on the written order of the Architect/Project Manager suspend the progress of the work or any part thereof for such time or time and in such a manner as the Architect/Project Manager may consider necessary and shall during such suspension properly protect and secure the work as considered necessary in the opinion of the architect/Project Manager or their representative-in-charge of the

work. No compensation shall be payable to the contractor on what so ever account for the suspension of work.

#### **3.4.14 Extension of time for completion**

If the contractor shall desire an extension of the time for completion of the work, on his having been unavoidably hindered in its execution or on any other ground, he shall apply in writing to the architect within three days of the date of starting of the hindrance on account of which he desires such extension as aforesaid. The architect in consultation with employer shall, if, in his opinion, will authorise, such extension of time, if any, as may in his opinion be necessary or proper extension granted shall be without prejudice to the right of the Employer to recover compensation for delay as per **provisions of Para 3.4.15**

#### **3.4.15 Liquidated Damages for Delay**

The times and date stipulated in the contract for the completion of the work or any part or stage thereof shall be deemed to be the essence of the contract.

The work shall, throughout the stipulated period of the contract, be carried out with all diligence. If the contractor fails to complete the work within the time prescribed or within the extended time under the contract, he shall pay to the Employer on demand amount without prejudice to other rights and remedies the Employer may have against the contractor, a sum of Rs. 1000/- per day as liquidated damages for such fault, if the work remain unfinished after the stipulated date of completion provided that the total liquidated damages payable shall not exceed 10% of the accepted contract price. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any money due or which become due to the contractor. The recovery or deduction of such damages shall not relieve the contractor from any obligations and liabilities under the contract.

#### **3.4.16 Defects Liability Period**

The contractor shall be responsible to make good and remedy at his own expense within such period as may be stipulated by the employer any defect which may develop or may be noticed before the expiry of 6 (six) months from the date of completion and intimation of which has been sent to the contractor within seven days of the expiry of the said period.

If the contractor or his work people, or servants shall break, deface, injure, or destroy any part of a building, or interiors, then the contractor has to rectify the same part at his own expenses to the satisfaction of the Architect.

#### **3.4.17 Approval of Materials**

The contractor would bring samples of necessary materials per the directions & would get them approved prior to execution of work.

### **3.5.0 SECURITY DEPOSIT**

#### **3.5.1 Rate of Security Deposit (Retention Money)**

The employer will, at the time of making any payment to the contractor for work done or supply made under the contract deduct 10% of Gross value of each interim bill. The maximum amount of Retention money + Earnest Money shall amount to total Security Deposit.

All compensations or other sums of money payable by the contractor to the employer in terms of this contract may be deducted from, or paid by, the sale of a sufficient part of his security deposit, or from any sums which may become due to the contractor by the employer on any account whatsoever, and in the event of his security deposit being reduced by reason of any such deduction or sale as aforesaid, the contractor shall within ten days. Thereafter make good in demand draft, endorsed in favour of the employer as aforesaid any sum or sums which may have been deducted from, or raised by sale of his security deposit or any part thereof.

#### **3.5.2 Forfeiture of Security Deposit**

The above said security deposit shall be liable to forfeiture wholly or in part at the sole discretion of the Employer if the contractor fails to carry out the work or perform or observe any of the conditions of the contract.

#### **3.5.3 Interest on the Security Deposit**

No interest would be payable by the employer to the contractor on the security held in deposit.

#### **3.5.4 Responsibilities for the Structural Adequacy**

The contractor shall comply with the provisions of the contract and with due cares and diligence, execute and maintain the work and provide all labour, including supervision of all works, structural plans and other things whether of temporary or permanent nature required for such execution and maintenance in so far as the necessary for providing these, is specified or is reasonably inferred from the contract. The contractor shall take full responsibilities for the adequacy, suitability and safety at site of all the works and methods of the construction provided.

### **3.6.0 MEASUREMENT AND PAYMENTS**

3. 6.1 All bill supported with measurement details shall be submitted by the contractor fortnightly to the Architect for all works executed in the previous period and the Architect/Project Manager or his representative shall verify the requisite measurement for the purpose of having the same verified for the claim as far as admissible, if possible before the expiry of 15 days from the presentation of the bill.

All measurements to be taken in duplicate and all bills shall be submitted in triplicate along with a contractor's copy of each.

### **3.6.2 Final Bill**

Final bill supported with consolidated measurement of the full work executed shall be submitted by the contractor within 1 month of completion of work.

When the final bill has been verified and corrected, the architect will give seven days notice to the contractor to countersign the bill in token of acceptance, the contractor shall countersign the bill within the above seven days or intimate in writing his intention to dispute. If the contractor fail to take appropriate action as above within the period prescribed, the bill finalised by the architect or his representative shall be final and binding on the contractor and the contractor shall have no right to dispute the same.

### **3.6.3 Claim for Interest**

No claim for interest will be entertained by the Employer with respect to any moneys or balances which may be in its hands owing to a dispute between itself and the contractor or with respect of any delay on the part of the employer in making interim or final payments or otherwise.

### **3.6.4 Rates for extra Additional, Altered or Substituted work**

The rates for additional, altered or substituted work shall be worked out in accordance with the following provisions in their respective order.

- i) If the rates for similar additional, altered or substituted work and directly available in the contract for the work, the contractor is bound to carry out the work at the same rates as are available in the contract for the work.
- ii) If the rates for additional, altered or substituted work are not directly available in the contract for the work the rates will be derived from the rates for a similar class of work as are specified in the contract for the work.
- iii) If the rates for the altered, additional or substituted work cannot be determined in the manner specified in sub-clause (i) to (ii) above,

then the contractor shall within three days of the date of receipt of order to carry out the work, inform the Architect of the rate which it is intended to charge for such works supported by analysis is of the rate or rates claimed. Rates finalised and approved by the Architect on the basis of these details will be final and binding. However, the architect by notice in writing will be at liberty to cancel his order to execute such work and arrange to carry it out in such a manner as he may deem advisable, but under no circumstances shall the contractor suspend the work once ordered in writing on the plea of non-settlement of rate.

### **3.6.5 Reimbursement of Variation in Price**

Prices and rates quoted by the bidders shall be considered as firm for the complete work and entire duration of the contract. No claim for extra payment due to any rise in rates of raw material and labour or due to whatsoever reasons, shall be considered, not even for extended period of completion.

### **3.7.0 GUARANTEES**

#### **3.7.1 Quality of Work**

The contractor shall guarantee that the materials and workmanship are the best of their respective kinds for the service intended and that all items of work will be free from all inherent defects in workmanship and materials. He shall also guarantee that the works will not fail in any respect due to quality of materials, workmanship and methods of construction.

The specifications assume a proper degree of skill on the part of contractor and workmen employed. The contractor shall consult the Architect or his representative, whenever in his judgment variation in the methods of construction or in the quality of material would be beneficial methods of construction or in the quality of material would be beneficial or necessary to fulfill the guarantee called for. Such variations may be made by the contractor only when authorised by the architect.

#### **3.7.2 Rejection**

If during the "Period of Guarantee", as defined under clause 3.7.6 hereof, any work or material shall fail in any respect to meet the above guarantee, the contractor shall replace such work or material in a condition which will meet the above guarantee, immediately.

#### **3.7.3 Cost of Execution of work or repair etc.**

All work of repair shall be carried out by the contractor at his own expense if the necessity thereof shall in the opinion of the Architect be due to the use of materials or workmanship not in accordance with the contract or on account of neglect or failure on the part of the contractor to comply with any obligation expressed or implied on the contractor's part under the contract.

#### **3.7.4 Remedy on Contractor's failure to carry out the work required**

If the contractor shall fail to do any such work as aforesaid required by the architect the employer shall be entitled to carry out such work which the contractor should have carried out, at the contractor's own cost. The employer shall be entitled to recover from the contractor the cost thereof or may deduct the same from any money due or that may become due to the contractor.

#### **3.7.5 Certificate of completion of works**

On completion of the work, the contractor shall be furnished with a certificate, but not such certificate be given nor shall the work be considered to complete until

the contractor shall have removed from the area of the premises (to be distinctly marked by the Architect/Project Manager in the site plan which, the work shall be executed) all scaffolding, surplus materials and rubbish and clean the dirt from all wood work, doors, windows, walls, floors or other parts of any building, in or upon which the work is to be executed, or of which he may have had in possession for the purpose of the execution hereof. If the contractor shall fail to comply with the requirements of the clause as to the removal of scaffolding, surplus materials and rubbish and cleaning off dirt on or before the date fixed for the completion of the work, the architect may at the expense of the contractor remove such scaffolding, surplus materials, and the contractor shall forthwith pay the amount of all expense so incurred, and shall have no claim in respect of any such scaffolding or surplus materials aforesaid, except for any sum actually realized by the sale thereof.

### **3.7.6 Period of Guarantee for Complete work**

The period of Guarantee for the works shall be **six** month starting from the date of issue of the completion certificate.

### **3.7.7 Contract Valid during Guarantee Period**

This contract shall remain valid and in force until the expiry of Guarantee period.

### **3.8.0 RESCINDING/TERMINATE CONTRACT**

#### **3.8.1 Rescinding Contract**

In any case in which under any clause or clauses of this contract the contractor has rendered himself liable to pay compensation amounting to the whole of his security deposit in hand of employer (whether paid in one sum or deduced by instalments) the architect on behalf of the employer shall have power to adopt any of the following course, as deemed best suited to the interests of employer.

- (a) To rescind the contract (of which rescission notice in writing to the contractor under hand of the architect shall be conclusive evidence), and in which case the security deposit of the contractor shall stand forfeited and be absolutely at the disposal of the employer.
- (b) To employ a contractor paid by the employer and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and the price of the materials (of the amount of which cost and price certificate of architect shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same rates as if it has been carried out by the contractor under the terms of the contract. The certificate of the architect as to the value of the work done shall be final and conclusive against the contractor.
- (c) To measure up the work of the contractor, and to take such part of the work of the contractor as shall be unexecuted out of his hands, and to give it to another contractor to complete in which case any expenses which may be

incurred in excess of the sum which would have been paid to the original contractor if the whole work has been executed by him (of the amount of which excess certificate in writing of the architect shall be final and conclusive) shall be borne and paid by the original contractor and may be deducted from any money due to him by employer under the contract or otherwise, or from his security deposit or the proceeds of sale thereof, or a sufficient part thereof.

- (d) In the event of any of the above courses being adopted by the architect, the contractor will have no claim to compensation to any loss sustained by him by reason of his having purchased any materials, or entered into any engagements made any advances on account of execution of the work or performance of the contract. And in case of the provisions aforesaid, the contractor shall not be entitled to be paid for any work actually performed under this contract unless and until the architect shall have certified in writing the performance of such work and the value payable in respect and he shall only be entitled to be paid the value so certified.

### **3.8.2 Termination of the Contract**

If at any time after the commencement of the work the employer for any reason whatsoever does not require the whole or part thereof as specified in the tender to be carried out, Architect/ Project Manager shall give notice in writing of the fact to the contractor who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage, which would have derived from the execution of the work in full, but which he did not derive in consequences the full amount of the work not having been carried out, neither shall he have any claim nor compensation by reason of any alterations having been made in the original specification, or the designs and instruction on which shall involve any containment of the work originally contemplated.

### **3.8.3 Jurisdiction**

The contractor and its operation shall be governed by the law of India for the time being in force, irrespective of the place of delivery of materials the place of execution of work or place of payment under this contract shall be deemed to have been entered into at Patna.

### **3.8.4 Bye Laws of Local Authorities**

The contractor shall conform to the provisions of any Government Acts which relate to works and to the regulations and bye laws of any local authorities. The contractor shall give all such notices required by the said Act or Laws, etc., and pay all fees payable to such authorities and allow for these contingencies in his tendered rates including fees for encroachment, stacking charges, costs of restorations, etc., and all other fees payable to the local authorities. The contractor shall keep the employer indemnified against all penalties and liabilities for every hand of breach of any such Act, Rules, Regulations or Bye -laws.

Contractor shall comply with all laws and statutory regulations dealing with the employment of labour such as:

- b. The payment of wages Act, 1936
- c. The Minimum Wages Act, 1938
- d. The Workmen Compensation Act, 1923
- e. The Contract Labour (Regulations & Abolishing) Act.
- f. The employer's liabilities Act, 1938
- g. Industrial Dispute Act, 1938
- h. Maternity Benefit Act, 1961
- i. The Employees State Insurance Act, 1948
- j. The Child Labour (Prohibition and Regulation) Act, 1986

Safety code, labour welfare Act or rules or any modification thereof any other laws and regulations framed by the Competent Legislative Authorities from time to time.

## **SECTION IV – SPECIAL CONDITIONS OF THE CONTRACT 4.1.0**

### **Insurance for Works**

The contractor at the time of signing the contract or before commencing the execution of work, without limiting his obligations and responsibilities shall insure the works at his own cost and keep them insured until the virtual completion of the contract against all acts of God including Fire, Theft, Riots, War, Floods etc. with a Nationalised Insurance company in the joint names of the employer and the contractor (the name of the former being placed first in the policy) for the full amount of the contract. Such policy shall cover the property of the employer and fees for assessing the claim and in connection with its services generally therein and shall not cover any property of the Contractor or of any sub contractor or employee. Such insurance shall be for a minimum value of Rs. 1.0 lakhs (Rupees One Lakh only).

The contractor shall deposit the policy and receipt for the premiums with the employer within seven (7) days, from the date of signing of the contract/commencement of the execution of the work or unless otherwise instructed by the employer. In default of the contractor insuring as provided above, the employer on his behalf may so insure and may deduct the premiums paid from any moneys due on which may become due to the contractor. The contractor shall as soon any claim under the policy is settled on the work reinstated by the Insurance office should elect to do so, proceed with all due diligence with, the completion of the works in the same manner as through the misfortune/accident had not occurred and in all respects under the same conditions of the contract. The contractor in case of rebuilding or reimbursement after accident shall be entitled to such extension of time for completion, as the employer deems fit.

#### **4.1.1 Insurance in respect of damage to persons and property**

- a. The contractor shall be responsible for all injury to persons, animals or things and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any approved sub-contractor's or employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever in any way connected with the carrying out of this contract. The clause shall be held to include any damage to buildings, whether immediately adjacent or otherwise, and any damage to roads, streets, foot paths, bridges and works forming the subject of this contract by frost or other inclemency of the weather. The contractor shall indemnify the employer and hold him harmless damage to persons or property as aforesaid and also respect of any claims made in respect of injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation of damages consequent upon such claims.

- b. The contractor shall reinstate all damages 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 third parties.
  
- c. The contractor shall 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 works in consequence thereof and shall at his own expense arrange to effect and maintain, until the virtual completion of the contract, with any Nationalised Insurance company in the joint name of the employer and the contractor against such risks and deposit such policy or policies with the employer from time to time during the currency of this contract. The contractor shall similarly indemnify the employer against all claims which may be made upon the employer whether under the Workman's Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the contractor or any sub - contractor and shall at his own expenses effect and maintain with an approved office a policy of Insurance in the joint names of the employer and the contractor against such risks and deposit such policy or policies with the employer from time to time during the currency of the contract. The contractor shall be responsible for anything which may be excluded from the insurance policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract. He shall also indemnify the employer in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award of or compensation of damages arising there from.
  
- d. The employer shall be at liberty and is empowered to deduct the amount of any damages, compensation costs, charges and expenses arising or occurring from or in respect of any such claim or damage from any sum or sums due to or become due to the contractor including the security deposit.
  
- e. If the contractor fails to comply with the terms of these conditions, the employer may insure the works and may deduct the amount of the premiums paid from any moneys that may be or become payable to the contractor or may at the option, not release running payment to the contractor until the contractor shall have complied with the terms of this condition.
  
- f. Such insurance whether effected by the employer or the contractor will not limit or bar the liability and obligation of the contractor to deliver the works to the employer completed in all respects according to the contract. In case of loss or damage due to any of the aforesaid clause, the moneys payable under any such insurance shall be received and retained by the employer until the works are finally completed and such moneys shall then be credited to the contractor in final settlement of accounts.

- g. If The Site being in the heritage zone, The contractor shall deal with all the approvals and handling of PMC and other Government agencies and full fill the all the directions issued either orally or written. Any objection raised by them shall be solved / resolved for which nothing shall be paid by The OICL.
- h. No incomplete works shall be accepted and nothing shall be paid to the contractor. However the part rates may be allowed to the contractor for the executed works which shall be treated as advance and recovered if the works left incomplete.
- i. The electrical load for PMC shall be got augmented by the Contractor with out any extra charges.

SPECIFICATIONS/BRAND NAMES approved by the Architect/Employer are listed in financial bid. However equivalent materials and finished of any other specialized firms may be used , In case it is established that the brands specified below are not available in the market are subject to the approval of the alternative brand by the Architect.

## **TENDER SPECIFICATIONS AND CONDITIONS FOR INTERNAL ELECTRICAL WORKS**

### **1.0 SCOPE AND EXCLUSION**

#### **1.1 General**

The electrical Installation work shall be carried out in accordance with Indian Standard Code of Practice for Electrical Wiring Installation IS:732-1989 and IS:2274-1963. It shall also be in conformity with the current Indian Electricity rules and regulations and requirements of the Local Electricity Supply Authority and Fire Insurance regulations, so far as these becomes applicable to the installation. Electrical work in general shall be carried out as per following CPWD Specifications with up to date amendment..

- General Specifications for Electrical Works.  
(Part I - Internal) - 2007.  
(Part II - External) - 1995.

Wherever this specifications calls for a higher standard of material and or workmanship than those required by any of the above mentions regulations and specification then the specification here under shall take precedence over the said regulations and standards.

#### **1.2 Scope**

The scope of work under this specifications shall include Design, Fabrication, Supply, Transportation to site, Storage, Erection, Testing and Commissioning of following items for complete internal electrification of THE ORIENTAL INSURANCE OFFICE (PATNA).

The items/activities covered under electrical works shall include the following.

- i) Main Distribution Board and sub distribution board.
- ii) Sub-main wiring from Distribution Board to sub D.B.
- iii) Point wiring of all lights, light plug points, fans, call bell, general purpose power points, power point for water heater etc. including piano type light & power switch & socket outlet boxes (M.S.), cover plate etc. complete in all respect.
- iv) Telephone/ PA system provision consisting of conduits, wires, telephone outlets, tag blocks etc.
- v) TV System provision consisting of conduits, wires, splitters / tap-off unit. TV outlets etc.
- vi) Earthing of complete electrical installation in all respect.
- vii) Obtaining approvals from Chief Electrical Inspector, Local Electricity Supply Authority and all other statutory authorities for the complete scope of work, as required.
- viii) Fire Detection system.
- ix) Lightening Protection System.

**1.2.1** The scope of work shall also include all civil works if required, associated with erection of distribution boards and conduit either concealed in walls or ceiling for light points, switch boxes, receptacles and drop below false ceiling, earthing & lighting system etc. Minor Civil Works like fixing of anchor bolts clamps, cleats and breaking of walls / floor installing conduits / cables / earthing conductors etc. and sealing of walls / floors afterwards shall also be included in the bidder's scope.

**1.2.2** It is not the intent to specify completely here in all aspects of design and constructional features of equipments and details of the work to be carried out, nevertheless, the equipment and work shall conform in all respects to high standards of Engineering, design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the owner who will interpret the meaning of the specifications and drawings and shall have right to reject or accept any work or material which in his assessment is not complete to meet the requirement of these specifications and or applicable codes and standards as laid down by statutory bodies specifications.

**1.2.4** Conduit layout to be prepared by the contractor based on circuit details indicated on working drawings duly checked by the owner (OICL- OFFICE).

- 1.2.5** Manufacturer drawing & technical data sheets to be submitted by the contractor to the owner for approval.

### **1.3 SPECIFIC EXCLUSION**

- a) All fixtures, fans (ceiling, bracket, exhaust), electronic fan regulator, call bell/buzzer shall be procured by owner(OICL OFFICE) and given to contractor at site for erection after completion of wiring.
- b) TV, Geyser and other items as desired.

## **2.0 DISTRIBUTION BOARD.**

### **2.1 D.B.**

#### **2.1.1 GENERAL**

Main Distribution Board shall be suitable for a fault level with stand capacity of not less than 25KA RMS symmetrical. Equipment shall be designed for operation in high ambient temperature and high humidity tropical atmospheric conditions as already covered in scope.

#### **2.1.2 STANDARD**

The equipment shall be designed to conform to the requirements of :

- i. IS : 8623 - Factory Built Assemblies of switchgear and controlgear.
- ii. IS : 4237 - General requirements for switchgear and controlgear for voltages not exceeding 1000 volts.
- iii. IS : 13947 - Degrees of protection provided by enclosures for low voltage switchgear and controlgear.
- iv. IS : 375 -Marking and arrangement of busbars.
- v. IS : 13947 - (Part-3)-1993 – Switch Disconnecter Isolator.
- vi. IS : 8828 - 1978 - Miniature Circuit Breaker.
- vii. IS : 13947 - (Part-2)-1989 - Moulded Case Circuit Breaker.

#### **2.1.3 CONSTRUCTIONS**

Following minimum clearances to be maintained after taking into account connecting bolts, clamps etc.

- i. Between Phases - 32mm.
- ii. Between Phases and neutral - 26mm.
- iii. Between Phases and earth - 26mm.
- iv. Between neutral and earth - 26mm.

All insulating materials used in the construction of the equipment shall be of non hygroscopic materials, duly treated to withstand the effect of high humidity, high temperatures, tropical ambient service conditions.

All doors/covers providing access to live power equipment/circuits shall be provided with tool operated fasteners to prevent unauthorised access.

#### **2.1.4 TEST AT MANUFACTURES WORK**

All routine tests specified in IS: 8623-1977 shall be carried out and test certificates submitted to the Engineer in charge.

#### **2.1.5 TESTING AND COMMISSIONING**

Commissioning checks and tests shall be included all wiring checks and checking up of connections. Primary/secondary injection tests for the relays adjustment/setting shall be

done before commissioning in addition to routine meggar test. Checks and tests shall include the following.

- a) Operation checks and lubrication of all moving parts.
- b) **Insulation test:** When measured with 500V meggar, the insulation resistance shall not be less than 100 mega ohms.
- c) Trip tests & protection gear test.

### **3.0. CONDUITING**

The Electrical wiring shall be done in recessed P.V.C. conduit, unless mentioned otherwise, except those used for fire protection system. Conduit work shall be carried out using ISI marked medium grade PVC conduit confirming to IS : 9537 part III , the interior of conduit shall be free from obstructions

No conduit less than 25mm in diameter shall be used.

### **3.1. INSTALLATION OF CONDUITS: -**

- i) The erection of conduits of each circuit shall be completed before the cables are drawn in.  
All joints shall be sealed/cemented with an approved solvent cement. Damaged conduit
- ii) conduit pipes fittings shall not be used in the work. Cut ends, socket etc. of conduit pipes shall have no sharp edges or any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.  
No bends shall be used which are formed either by bending the pipes by heating.
- iii). All accessories such as bends. Elbows or similar fittings etc. shall be of factory made only.  
Radius of bends in conduit pipes shall not be less than 7.5cm No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet. Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured and that the internal diameter is not effectively reduced.

### **3.2 BENDS: -**

As per as possible the conduit system shall be so laid out that it shall obviate use of tees, elbows and sharp bends. No length of conduit shall have more than the equivalent of two-quarter bends from inlet to outlet.

### **3.3 CONDUIT ACCESSORIES: -**

The conduit wiring system shall be complete in all respects, including their accessories. Bends couplers etc. shall be solid type in recessed type or works and may be solid or inspection type as required, in surface type of works. The accessories shall conform in all respects to the relevant ISS. Samples shall be got approved by Engineer In-Charge before use.

### **3.4 TYPE AND SIZE OF CONDUIT**

Point wiring for lights, fans, exhaust fans, call bell, power point, circuit wiring & sub-main wiring shall be carried out as per General Specification for Electrical Works (Part-Internal)-1994. Entire

internal electrical works shall be carried out in concealed / surface/ recessed conduit system unless otherwise specifically mentioned on the drawing.

Conduits shall be medium gauge rigid PVC as per IS Specifications. Conduits shall be ISI marked conforming to IS : 9537 (Part-3)-1983. All conduit and conduit accessories shall be of PVC. Conduits shall be joined together by a vinyl type cement / solvents. Minimum size of conduit shall be 20mm. For termination of PVC conduits into switch outlet boxes, PVC female adapters shall be used. Wherever conduit run exceeds 10 metre, circular junction boxes shall be provided to facilitate pulling & inspection for circuit & submain wires. Inspection boxes shall be suitable located in coordination with the Engineer-in-charge. Conduits shall be bend using suitable size springs. Long radius bends shall be provided. Heating shall not be used to bend the conduits. Size of conduit shall depend upon number and size of wires to be drawn. M.S. conduits shall be used for fire detection system.

### **3.5 FIXING OF CONDUIT**

#### ***Recess / Concealed Conduit***

The chase in the wall shall be neatly made and of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of building under construction, conduit shall be buried in the wall before plastering and shall be finished neatly after erection of conduit. In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work. Entire work of chasing the wall, fixing the conduit in chases and burring the conduit in mortar before plastering shall form part of point wiring work.

The conduit pipe shall be fixed by means of staples or by means of saddles not more than 60cm apart or by any other approved means of fixing. Fixing of standard bends and elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with the long radius which shall permit easy drawing in of conductors. All joints of conduit pipe shall be treated with some approved preservative compound to secure protection against rust. Suitable inspection boxes to the barest minimum requirements shall be provided to permit periodical inspection and to facilitate replacement of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers. Wherever the length of conduit run is more than 10 meters, then circular junction box shall be provided for circuit & sub main wiring.

### **4.0 SHEET METAL OUTLET/DRAW/INSPECTION/JUNCTION BOXES: -**

#### **4.1 GENERAL: -**

Wherever required outlet boxes of required sizes shall be fabricated from 1.6mm thick MS sheets excepting ceiling fan outlet boxes, which shall be fabricated from minimum 2mm thick sheets. Outlet boxes shall be provided with minimum 16mm projected threaded collars. The outlet boxes shall be of approved quality, finish and manufacture. All outlet boxes shall be provided with an earth stud. The boxes shall be protected from rust by zinc phosphate primer process. For concealed conducting work, boxes with primer only could be embedded. For surface conducting work, the boxes shall be finished with minimum one coat of enamel paint of approved colour. The outlet boxes shall be so protected at the time of fixing that no mortars find its way inside during concrete filling or plastering. For concealed conduiting work, outlet boxes shall be completely embedded in walls/ceiling leaving edges flush with finished wall/ceiling surface.

#### **4.2 SWITCH/SOCKET OUTLETS BOXES-MODULAR TYPE"-**

Boxes suitable to house modular type switches/sockets of required ratings, and fan regulators as required shall be provided. In case the number of switches in one box is not tallying with that available in standard manufacture, the box accommodating the next higher number of switches shall be provided without any extra cost in case fan regulator/regulators is/are to be provided at a latter stage, suitable provision for accommodating such regulators shall be made in the switch boxes and blank off covers shall be provided without any extra cost. The outlet boxes shall be of MS having external and internal surface true to finish. All boxes shall have adequate number of knock out holes of required diameter and earth stud. Unless otherwise stated boxes shall be located with bottom at 1200mm above finished floor level.

#### **4.3 OUTLET BOXES FOR LIGHT FITTINGS.**

These shall be minimum 75mm x 75mm x 50mm deep and provided with threaded collars for conduit entry as required. For ceiling mounted florescent fittings, the boxes shall be provided 300mm off center for a 1200mm fitting and 150mm off center for a 600 mm fitting so that the wiring is taken directly to the down rod 3mm thick Perspex/phylum sheet cover of matching colour shall be provided.

#### **4.4 CEILING FAN OUTLET BOXES: -**

Outlet boxes for ceiling fans shall be fabricated from minimum 2mm thick MS sheet steel. The boxes shall be hexagonal in shape of minimum 100mm depth and 60mm sides each boxes shall be provided with one 'U' shaped 15mm dia rod inside security tied to the top reinforcement of the concrete slab for a length of minimum 150mm on either side 3mm thick Perspex/phylum sheet cover of matching colour shall be provided.

**4.5 DRAW BOXES: -**

Draw boxes of minimum 75mm x 75mm x 50mm deep or larger as required shall be provided all convenient locations to facilitate drawing of long runs of conductors. These shall have screwed covers of 3mm thick Perspex/phylum sheet.

**INSPECTION BOXES/JUNCTION BOXES**

Inspection boxes of minimum 75mm x 75mm x 50mm deep shall be provided at suitable location in conduit runs to permit inspection and maintenance. These shall have screwed covers of 3mm thick Perspex/phylum sheet.

**4.6 CROSS SECTION: -**

The conduits shall be of ample sectional area to facilitate simultaneous drawing of wires and permit future provision also. Total cross section of wires measured overall shall not normally be more than half the area of the conduit. Maximum number of insulated 650/1100 Volt grade copper conductor wires conforming to IS: 694-1990 shall be as per I.S. Norms: -

**4.7 LAYING OF CONDUITS: -**

Conduits shall be laid either concealed in walls and ceilings or on surface on walls and ceiling or partly concealed and partly on surface as required. Same rate shall apply for concealed and surface conducting in this contract.

**4.7.1 CONCEALED CONDUITING: -**

Concealed conduits in concrete members shall be laid before casting in the upper portion of slabs/ fixing false ceiling or otherwise as may be instructed, so as to embed the entire run of conduits and ceiling outlet boxes with a cover of minimum 12mm concrete. Conduits shall be adequately laid to the reinforcement to prevent displacement during casting at intervals of maximum. 1 meter. No reinforcement bars shall be cut to fix the conduits. Suitable flexible joint shall be provided at all locations where conduits cross expansion joints in the building. Concealed conduits in brickwork shall be laid in chases to be cut by electrical contractor in brickwork before plastering. The chases shall be cut by a chase-cutting machine. The chases shall be of sufficient width to accommodate the required number of conduits and of sufficient depth to permit full thickness of plaster over conduits. The conduits shall be secured in the chase of means of suitable clamps at intervals of maximum 1 meter. The chase shall then be filled with cement and coarse sand mortar (1:3) and properly cured by watering.

Entire concealed conduit work in concrete members and in brickwork shall be carried out in close coordination with progress of civil works. Conduits in concrete members be laid before casting and conduits in brickwork shall be laid before plastering. Should it become necessary to embed conduits in already cast concrete members, suitable chase shall be cut in concrete for the purpose. For minimizing this cutting conduits of lesser diameter than 25mm and outlet boxes of lesser depth than 50mm could be used by the Contractor for such extensions only after obtaining specific approval from EMPLOYER. For embedding conduits in finished and plastered brick work the chase would have to be made in the finished brickwork. After fixing conduit in chases, chases shall be made good in most workmanlike manner to match with the original finish. Cutting chases in finished concrete of finished plastered brick work for embedding conduits and cutting boxes etc. shall be done by the Contractors without any extra cost.

**4.8 PAINTING OF BOXES: -**

All draw/switch/junction/fan-hook boxes shall be painted with red oxide/galvanized/zinc passivated in their manufacture form. All ungalvanized unplanted boxes shall be again painted with red oxide paint as required before fixing. Boxes fixed on surface shall, in addition, be painted with finishing paint of approved colour and finish.

Before laying conduits shall be painted at such places where painted has been damaged due to vice or wrench grip or any other reason.

**4.9 PROTECTION OF CONDUITS: -**

To safeguard against filling up with mortar/plaster etc. all the outlet and switch boxes shall be provided with temporary covers and plugs which shall be replaced by sheet/plate cover as required. All screwed and socketed joints shall be made fully water tight with white lead paste. Wherever false ceiling is used conduit shall be laid self supporting through proper arrangement.

#### **4.10 CLEANING OF CONDUIT RUNS: -**

The entire conduit system including outlets and boxes shall be thoroughly cleaned after completion of erection and before drawing in of cables.

#### **5.0 WIRING :-**

##### **5.1 GENERAL: -**

**TECHNICAL SPECIFICATION** in this section cover item of wiring installations comprising of: -

Point wiring including circuit wiring for light fan and call bell points as also Lighting And power CONVENIENCE SOCKET outlet points in concealed surface conduit. Sub main wiring in concealed/surface conduct.

##### **5.2 STANDARDS AND CODES”-**

All equipments components materials and entire work shall be carried out in conformity with applicable and relevant Bureau of Indian Standard and Codes of Practice, as amended up to date and as below in addition, relevant of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standard is not available relevant British and/or IEC Standard shall be applicable.

Equipments certified by Bureau of Indian Standard shall be used in this contract in line with movement regulations. Test certificates in support of this certification shall be submitted, as required.

It is being noted that updated and current standards shall be applicable irrespective of dates mentioned along with ISSS's in the tender documents.

	IS: 694:1977
650/1100V grade PVC insulated wires	IS: 694:1977
Rigid PVC conduits for electrical wiring	IS: 9537 Part –III
Switch socket outlets	IS: 4615:1968
Switches for domestic and similar purposes	IS: 3854:1966
Boxes for the enclosure of electrical accessories	IS: 5133:1969
Code of Practice for Electrical Wiring Installations	IS: 732:1989

All PVC insulated stranded copper conductor wires shall conform to Relevant code. Cable conductor size and material shall be as specified in BOQ.

All internal wiring shall be carried out with PVC insulated FRLS/EBCL wires of 650/1100 volts grade. The circuit wiring for points shall be carried out in looping in system and no joint shall be allowed in the length of the conductors. Circuit wiring shall be laid in separate conduit originating from distribution board to switch board for light/fan. A light/fan switch board may have more than one circuit but shall have to be of same phase. Looping circuit wiring shall be drawn in same conduit as for point wiring. Each circuit shall have a separate neutral wire. Neutral looping shall be carried out from point to point or in light/fan switch boards. A separate earth wire shall be provided along with circuit wiring for each circuit. For point wiring red colour wire shall be used for phase and black colour wire for neutral. Circuit wiring shall be carried out with red, yellow or blue colour PVC insulated wire for RYB phase wire respectively and black colour PVC insulated wire for the neutral wires. Insulated copper wire shall be used as earth continuity conductor and shall be drawn along with other wires. No wire shall be drawn into any conduit until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire.

Before the wires are drawn into the conduit, the conduits shall be thoroughly cleaned of moisture, dust and dirt. Drawing & termination of copper conductor wires & cables shall be as per CPWD specifications.

### **5.3 JOINTS**

All joints shall be made at main switches, distribution board socket and switch boxes only. No joint shall be made in conduits & junction boxes. Conductors shall be continuous from outlet to outlet.

### **5.4 MAIN AND SUB MAIN CABLES**

Mains and sub-main cable where called for shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawings of the sub-main & main cables. Cost of junction box/drawn box is deemed to be included in the rates of sub main wiring. As independent earth wire of proper rating shall be provided for every sub-main.

Where mains and sub-mains cables are connected to the switchgear, sufficient extra lengths of sub main and mains cable shall be provided to facilitate easy connections and maintenance. For termination of cables criping type cable socket/lugs shall be provided. Same colour code as for circuit wiring shall be followed.

### **5.5 COLOUR CODE FOR CIRCUIT & SUBMAIN WIRING**

Colour code for circuit & sub main wiring installation shall be Red, Yellow, Blue for three phases. Black for neutral and yellow/green or green only for earth incase of insulated earth wire.

### **5.6 CLASSIFICATION OF POINTS**

#### **5.6.1 GENERAL**

Classification and measurement of Point wiring shall be as per CPWD specification for Electrical Works (Part I-Internal)-1994.

#### **5.6.2 CONDUCTOR SIZE**

Wiring shall be carried out with following sizes of PVC insulated stranded single core copper conductor wire/cable.

i)	Light point.	- 1.5 Sq.mm
ii)	Ceiling /Cabin/Exhaust Fan Point	- 1.5 Sq.mm
iii)	Call Bell Point	- 1.5 Sq.mm
iv)	Plug Point (6Amp S.S. Outlet)	- 1.5 Sq.mm
v)	Circuit Wiring	- 2.5 Sq.mm
vi)	General Power Point (First Point)	- 4.0 Sq.mm
vii)	General Power Point (Second Point)	- 2.5 Sq.mm
viii)	Geyser/A.C.	- 4.0 Sq.mm
ix)	Other sub main as per BOQ.	
x)	Telephone	- 0.61 Sq. mm

xi) T.V. coaxial cable.

**Maximum number of PVC insulated 650/1100 V grade aluminium/copper conductor cable conforming to IS : 694 – 1990 that can be drawn in to PVC/MS Conduit.**

Nominal Cross-Sectional Area of Conductor In sq.mm	20mm		25mm		32mm		38mm		51mm		64mm
	S	B	S	B	S	B	S	B	S	B	
1	2	3	4	5	6	7	8	9	10	11	12
1.50	5	4	10	8	18	12	-	-	-	-	-
2.50	5	3	8	6	12	10	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12
25	-	-	-	-	3	2	5	3	8	6	9
35	-	-	-	-	-	-	3	2	6	5	8
50	-	-	-	-	-	-	-	-	5	3	6
70	-	-	-	-	-	-	-	-	4	3	5

**NOTE :**

1. The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.
2. The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15 degrees.

**5.6.3 EARTHING**

Continuous earth wire shall be provided for all points, outlets and sub-mains. Earthing terminals shall be provided inside all switch boxes, outlet boxes and draw boxes etc.

**6.0 WIRES: -**

**6.1 MATERIAL: -**

Wires shall be PVC insulated FRLS/EBCL with stranded copper conductors, unless otherwise stated of 650/1100 Volt grade, conforming to IS: 694-1990. All wires shall bear manufacture's label and shall be freight to site in new and original packages. Manufacture's certificate, certifying that wires brought to site are of their manufacture shall be furnished as required.

## **6.2 BUNCHING OF WIRES”-**

Wires carrying current shall be so bunched in conduits that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

## **6.3 DRAWING OF WIRES”-**

The drawing of wires shall be executed with due regard to the following:-

No wire shall be drawn into any conduit, until all work of any nature that may cause injury to wires is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Bushes shall be provided at conduit edges.

Before the wires are drawn conduits, conduits shall be thoroughly cleaned of moisture dust, dirt or any other obstruction by forcing compressed air through the conduits if necessary.

While drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks, which could cause breakage of conductors. There shall be no sharp bends.

## **6.4 TERMINATION/JOINTING OF WIRES: -**

Sub-circuit wiring shall be carried out in looping system. Joints shall be made only at distribution board terminals, switches/buzzers and at ceiling roses/connectors/lamp holder's terminals of lights/fans/socket outlets. No. Joints shall be made inside conduits or junction/draw/inspection boxes.

For wiring of lighting circuits, looping of neutrals should be done preferably at switchboard. Terminating strips should be used for neutral and live conductors. For connecting the switches to the terminating strips short length flexible PVC insulated wires should be used.

If looping neutral at switchboard is not feasible then terminating strip should be used at junction boxes. Sizing of the junction boxes should be done accordingly.

**Wiring** conductions shall be continuous from outlet to outlet. Joints where unavoidable due to any specified reasons shall be made by approved connectors. Specific prior permission from EMPLOYER in wiring shall be obtained before making such joint.

Insulation shall be shaved off for a length of 15mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or wringing.

Conductors having nominal cross sectional area exceeding 4 Sq.mm. shall always be provided with crimping sockets.

At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used.

Brass nuts and bolts shall be used for all connections.

The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less.

Switches controlling lights, fans, socket outlets etc. shall be connected to the phase wire of circuits only.

Only certified wiremen shall be employed to do wiring/jointing work.

## **6.5 LOAD BALANCING”-**

Balancing of circuits in three phase installations shall be planned got approved from consultant before the commencement of wiring and shall be strictly adhered to.

**6.6** Wires of same phase/three phase shall run in one conduit. Where wires of two phases are to run they are not allowed in one conduit. Separate conduit shall be used in this case.

**7.0 SWITCHES/SOCKET OUTLETS: -**

**7.1 SWITCHES”-**

All 6 and 16 Amps. Switches shall be of modular flush mounting type. Unless otherwise Stated suitable for 250 Volt AC supply best quality and of approved make. The switch moving and fixed contacts shall be of silver nicked and silver graphite alloy and contact tips coated with silver. Housing of switches shall be made from high impact resisting flame reading and ultra violet stabilized engineering plastic materials. Switches shall be fixed the box on adjustable MS strips/plates with tapped holes brass machine screws, leaving ample space at the back and side for accommodating wires.

**7.2 COMBINATION OUTLETS: -**

6A 3 pin/2 pin combination outlets mounted on switch boards along with other lighting control/switches. Each such outlets will have a corresponding controlling switch mounted next to the outlet such outlets may be looped into the corresponding lighting circuit.

**7.3 SOCKET OUTLETS: -**

6/16 Amps socket outlets shall be of modular flush mounting type, unless otherwise stated, and shall be switched, three-pin type and fitted with automatic linear safety shutters to ensure safety from prying fingers. Socket outlets shall be made from impact resistant, flame retarding and ultra violet stabilized Engineering plastic material.

Switches and sockets shall be located in the same plate plates for 6 Amp. Switched/unswitched power and telephone outlets shall be of the same size and shape.

An earth wire shall be provided along the wires feeding socket outlets for electrical Appliances. The earth wire shall be connected to the earthing terminal screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box.

**7.4 FLUSH PLATES”-**

Switches socket outlets, receptacles, and telephone outlets etc. in walls shall be provided with moulded modular coger plates of approved colour, shape and size made from high impact resistant, flame retarding Polycarbonate and secured to the box with counter sunk /found head chromium plated brass screws unless otherwise stated. Where two or more switches are installed together they shall be provided with one common switch cover plate as described above with notches to accommodate all switches either in one, two or the rows.

One and two-gang switch cover plate, telephone outlet cover plate 6 and 16 Amps. Switched/unwatched outlet plates. Shall have the same shape and size. Three and four gang switch cover plates shall have the same shape and size Six and Eight gang switch cover plates shall have the same shape and size Nine and Twelve switch cover plates shall have the same shape and size. Wherever five switches seven switches, ten switches and eleven switches are to be fixed the next higher size of gang switch cover plate to be used and extra openings shall be provided with blank-offs without extra cost.

**8.0 POINT WIRING: -**

**8.1 MEASUREMENT AND PAYMENT: -**

Wiring for light, ceiling fan, exhaust fan, call bell, socket, outlet and telephone outlet points, carried out as per tender specification. Shall be measured and paid on point basis only. No part of point wiring items shall be paid on linear basis. (Rates quoted for point wiring items shall be based on

parameters stipulated below. Average wiring length and average conducting length forming the basis of point wiring rates, shall take the electrical layouts of the entire project into consideration tenderers are advised to seek clarifications. If they so desisted on this aspect before submitting tenders. No claim for extra payment on account of electrical layout in parts of projects requiring larger average wiring and conduit length per point whether specifically shown in tender drawings or not, shall be entertained after the award of contract.

## **8.2 PARAMETERS”-**

Point wiring shall be carried out as per following parameters.

In concealed conduit system unless otherwise stipulated.  
Only looping system of wiring shall be adopted throughout.  
All accessories shall be flush type unless otherwise stated.  
For estimation of load, following loads per point shall be assumed.

Light points	40 Watts.
6 Amps socket outlet points	250 Watts.
Fan points	60 Watt.
Exhaust fan points	150 Watts or as specified
16 Amps. Socket outlet points.	500 Watt or as per actual use.

Light points, fan points and 6 Amp. Socket outlet points may be wired on a common final such circuit. Such circuit shall not normally have more than a total of 10 light, fan or socket outlets of a load of 800 watts unless otherwise is stipulate. Wiring from DB to the first switch in each sub circuit is defined as circuit wiring, which shall be wired with one size higher wire.

Power circuits shall normally have maximum Two 16 Amps socket outlet unless otherwise stated. Separate circuit shall be run for window air conditioners and similar appliances.

Point wiring rates shall include cleaning of dust, splashes of colour wash or paint from all fixtures, fans, fittings, etc. at the time of taking over of the installation.

## **8.3 POINT WIRING DEFINITIONS: -**

### **8.3.1 LIGHT POINTS: -**

Point wiring for light points shall commence at the distribution board terminals and shall terminate at the ceiling rose/conned or in ceiling box/fixture terminal via the control switch. Rates quoted shall be deemed to be inclusive of the cost of entire materials and Labour required for completion of point wiring thus defined including: a) conducting system complete with all accessories, junction/draw/inspection boxes, check nuts etc. complete as required. b) Wiring with stranded copper PVC insulated 6601/1100-volt grade wires for point wiring including circuit wiring (wiring from distribution board terminals to the first switch in the sub-circuit) and terminations etc. complete as required. c) Control switch with switch box and cover plate of specified type including fixing screws, earth terminal etc. complete as required. d) Loop earthing with PVC insulated stranded copper wires complete as required.

### **8.3.2 CEILING/WALL MOUNTED FAN POINTS: -**

Point wiring for ceiling fan points shall be the same as for light points stated above accepting that the conducting system shall also include providing a concealed type fan outlet box as specified above and that the control switch box shall have space provision for providing a fan regulator as required. Point wiring for wall mounted air circulator fans shall be the same as for ceiling fans excepting that the wiring terminate an outlet box with connector instead of a ceiling fan outlet box.

**8.3.3 CALL BELL LPOINTS: -**

Points wiring for call bell points shall be the same as for light points excepting that a bell push shall be provided in lieu of the control switch and the point wiring rate shall also include the cost of supplying and fixing call bell/buzzer of approved make and type.

**8.3.4 5 PIN 6 AMPS SOCKET OUTLET POINT (LIGHTING)**

Point wiring for lighting convenience socket outlet points shall be same as for light point above and shall in addition, include supply and fixing a 5 pin 6 amps socket outlet along with the 6 amps. Control switch mounted and earthing of the third pin earthed with PVC insulated stranded copper wire unless otherwise specified.

**8.3.5 6 PIN 6/16 Amps OUTLET POINT (Power)**

Point wiring for power convenience socket outlet point shall be same as for light points above and shall in addition includes cost of supply and fixing a 6 pin 6/16 amps socket outlet along with, 16 amps control switch in lieu of the light control switch and earthing of the third pin earthed with PVC insulated FRLS/ EBCL stranded copper wire unless otherwise specified.

**8.3.6 EXHAUST FAN POINT: -**

Wiring for exhaust fan points shall be same as for 5 pin 6 amp socket outlet point excepting that the socket outlet and the control switch shall not be in the same box. The socket outlet shall be located near the exhaust fan and the control switch shall be located near the light control switches of the room.

**8.3.7 GEYSER POINT : -**

Wiring for geyser point shall be same as for 6 pin 6/16 Amp socket outlet point excepting that the socket outlet and controlled switch shall not be in the same box. The socket outlet shall be located near the geyser and the control switch shall be located near the room entrance or as directed by site engineer.

**8.3.8 CIRCUIT WIRING: -**

Minimum size of PVC insulated FRLS/EBCL copper conductor wires for all circuit wiring for light exhaust fan, ceiling fan and lighting convenience outlet points shall be 2.5Sq.mm unless otherwise specified.

Circuit wiring shall not be separately measured and paid for. Point wiring rates shall include the cost of circuit wiring as required.

**8.4 SUB-MAIN WIRING: -**

Sub-main wiring shall comprise of stranded copper conductor PVC insulated FRLS/ EBCL, 1100 Volt grade wires in MS conduits including loop earthing terminations etc. complete as required.

Sizes of conduits number/type/size of wires and loop earthing shall be as stipulated in the schedule of quantities and/or drawings.

Wires shall be drawn in the concealed or surface conduits as required without being damaged. For this purpose draw boxes shall be located at convenient locations.

Every sub-main shall run in an independent conduit with an independent earth wire of PVC insulated stranded copper wire as specified running along the entire run of conduit. For single phase, one earth wire shall run and for three phase two earth wires shall run.

Necessary provision of wire lengths entering and emerging from the conduit shall be made for connections.

**9.0 TELEPHONE WIRING SYSTEM**

**9.1 CONDUCTING**

Conduiting for telephone system shall be carried out in medium gauge PVC Conduit. Separate conduit shall be provided for Telephone cables. Conduiting shall be carried out as per clause No. 3.0 of this specification.

**9.2 WIRING**

Each telephone outlet shall be wired with 2 Pair 0.61mm tinned copper telephone wire from floor wise Telephone Tag Block. All floor wise tag blocks shall be connected to Main Telephone Tag Block of respective block.

Following number of 2 pair wires/cables shall be drawn in various sizes of conduits as listed below.

25mm conduit - Upto 6 Nos. Cables.

**9.3 OUTLETS**

All telephone outlet shall be jack outlet (RJ-11). Cover plate shall be phenolic laminated sheet.

**10 TELEVISION CONDUCTING**

Conduiting for SMATV System shall be carried out in medium gauge PVC Conduit. Separate conduit shall be provided for coaxial cables. Conduiting shall be carried out as per clause No. 3.0 of this specification.

**10.1 COAXIAL CABLES**

The coaxial cable shall be of wide band type as per BOQ item.

**11.0 MCB DISTRIBUTION BOARDS : -**

**11.1 STANDARDS AND CODES: -**

The following Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply wherever appropriate Indian Standard are not available, relevant British and/or IEC Standard shall be applicable.

BIS certified equipment should be used as a part of the contract in line with Government regulations. Necessary test certificates in support of the certification shall be submitted prior to supply of the equipment.

It is to be noted that updated and current Standard shall be applicable irrespective of those listed below

Miniature Circuit Breakers	IS: 8828-1996
Low voltage Switchgear and control gear assembly	IS: 8623-1993
Degree of protection provided by enclosures for Low voltage switchgear	IS: 2147-1962
Code of practice for selection, installation and maintenance of Switchgear & control gear	IS:10118-1982

**11.2. MINIATURE CIRCUIT BREAKERS: -**

The MCB's shall be of the completely molded design suitable for operation at 240/415 Volts 50 Hz system MCB's shall be quick make and break type conforming to relevant IS: Housing shall be heat

resistant and have a high impact strength. MCB, s shall be flush mounting type and shall be provided with trip free manual operating liver with ON/OFF indications.

Miniature Circuit Breakers for lighting circuits shall be of "B" series (as equivalent to 'L' series) where as 'C' series (as equivalent to 'G' series) MCB's shall be invariably used for all power circuits. All miniature circuit breakers shall be of 10KA rated rupturing capacity.

### **11.3 DISTRIBUTION BOARDS: -**

Distribution Board shall be double door type with extended loose wire box at the top. All distribution boards shall be of three phase or single phase type with incoming isolator or MCB and as in Schedule of quantities. MCB DB's shall be of surface/recess mounting pattern, dust & vermin proof conforming to IP42 and shall be fabricated out of CRCA sheet steel 1.6mm thick. MCB DB's shall have removable end plates with knock outs at the bottom and top and shall have hinged cover with locking arrangement. Only the knobs of the MCBs shall preclude out of the front cover through opening neatly machine made for the purpose. The bus bars shall be solid electrolytic copper of appropriate cross section. Din bar shall be provided for mounting the MCBs. MCB DB shall be provided with loose wire box as a compartment for the complete width & depth of the board and of minimum height of 125mm in the case of TPN DB's and 100mm in case of SPN DB's. Distribution boards shall contain plug in or bolted type miniature circuit breaker mounted on bus bars. Miniature circuit breakers shall be quick make & quick break type with trip free mechanism, they shall have thermal & magnetic short circuit protection. MCB shall conform with IS 8828-1978. Neutral bus bars shall be provided with the same number of terminals as there are single ways on the board, in addition to the terminals for incoming mains. An earth bar of similar size as the neutral bar shall also be provided. Phase barrier shall be fitted and all live parts shall be screened form the front. Ample clearance shall be provided between all live metal and the earth case and adequate space for all incoming and outgoing cables. All distribution board enclosures shall have an etched zinc base stove followed by synthetic stoved enamel, colour light gray. A circuit identification card in clear plastic cover shall be provided for each distribution board.

Distribution board shall be provided with MCB and/or earth leakage circuit breaker as mentioned in drawings and BOQ. MCB's used shall be of one/same manufacturer. Manufactured by approved manufacturer shall be used. In case size specified in BOQ is not standard size of manufacturer, in that case next standard size distribution board box shall be used with incoming & outgoing MCB as specified in BOQ. Additional cutout/space for outgoing MCB shall be plugged with blank plates. No extra cost shall be paid for using bigger/higher size distribution board box and blank plates.

All outgoing equipment shall be concealed direct to the bus bar on the live side. The equipment shall be mounted on a framework for easy removal and maintenance.

Knock out holes of appropriate size and number shall be provided a top and bottom for facilitating conduits connection.

MCB's shall be provided on the phases of each circuit. Individual banks of MCB's shall be detached. There shall be ample space behind the banks of MCB's to accommodate all the wiring. All the DB's shall be completely factory wired ready for connections. The entire terminal shall have adequate current rating and size to suit individual feeder requirement. Each circuit shall be clearly numbered from left to right to correspond with wiring diagrams. All circuits shall be distinctly marked with description of service installed.

The sheet steel shall undergo a rigorous rust proofing process and two coats of primer with final powder coated paint finish.

All the circuit shall have an independent neutral insulated wire, one per circuit, and shall be numbered and marked.

A sample of the finished DB shall be got approved by Engineer In-Charge before bulk fabrication and supply.

**11.4 SHEET STEEL TREATMENT AND PAINTING: -**

Sheet Steel materials used in the construction of these units should have undergone a rigorous rust proofing process comprising of alkaline degreasing, decaling in dilute sulphuric acid and a recognized phosphate process. The steel work shall then receive two coats of oxide filler primer before final painting. Castings shall be scrupulously cleaned and fitted before receiving a similar oxide primer coat.

All sheet steel shall after metal treatment be given powder coated finish painted with two coats of shade 692 to IS 5 on the outside and white on the inside. Each coat of paint shall be properly stopped and the paint thickness shall not be less than 50 microns.

**11.5 NAME PLATES AND LABELS: -**

Suitable engraved white on black nameplates and identification labels of metal for all Switch Boards and Circuit shall be provided. These shall indicate the feeder number and feeder designations

**11.6 INSTALLATION: -**

MCB DB's shall be recessed in wall with covers flush with finished wall surface. Unless otherwise stated DB's shall be fixed with bottom at 1200mm from finished floors DB's shall be fixed properly, fitted square with the frame and with holes correctly positioned DB's shall be fastened to the walls with suitable grouted studs of not less than 12mm dia.

**11.7 TESTING AND COMMISSIONING: -**

Copies of type sets and routine test as per relevant specification carried out at manufacture's work shall be submitted to the Architect/Engineer-In-Charge as required.

Wiring and connection shall be checked for continuity.

Insulation shall be measured with a 500 V Megger and insulation resistance shall not be less than 100 Mega ohms.

Tests shall be performed in presence of authorized representative of the Architect/EMPLOYER for which the contractor shall give due prior notice.

**12.0 EARTHING: -**

**12.1 STANDARDS:** -IS 3043 1987 along with Rules Regulations, Directives and Specifications stipulated above, of these specifications shall apply.

**12.2 GENERAL: -**

All the non-carrying metal parts of electrical installation shall be earthed properly. All metal conduits, trucking, cable sheaths, switchgear, distribution fuse boards, light fittings and all other parts made of metal shall be bounded together and connected by means of specified earthing conductors to an efficient earthing system. All earthing shall be in conformity with Indian Electricity Rules.

The Earthing system shall in totally comprise the followings: -

- a) Earth Electrodes
- b) Earthing Leads
- c) Earth Conductors

All three-phase equipment shall have two separate and distinct body earths and single-phase equipment shall have a single body earth.

**12.3 EARTHING MATERIAL: -**

Materials of which the protective system is composed shall be resistant to corrosion or be adequately protected against corrosion. The material shall be as specified in the schedule of quantities and shall comply to the following requirements.

- a) Copper-When solid or stranded copper wire is used it shall be of the grade ordinarily required for commercial electrical work generally designated as being of 98% conductivity when annealed, conforming to Indian standard specifications.
- b) Galvanized Steel-Galvanized steel used shall be thoroughly protected against corrosion by hot dipped Zinc coating. The material coating shall withstand the test specified in IS: 2309-1969.

#### **12.4 EARTH ELECTRODE PIT :-**

##### **METHOD OF INSTALLING WATERING ARRANGEMENT**

In the case of pipe earth electrode, a watering pipe of 50mm dia of medium class G.I. pipe shall be provided and attached to the electrode. A funnel with mesh shall be provided at the top of this pipe for watering the earth. The watering funnel attachment shall be housed in masonry enclosure of not less than 300 x 300 x 450mm. A cast iron/M.S. frame with cover having locking arrangement shall be suitably embedded in the masonry enclosure.

##### **LOCATION OF EARTH ELECTRODE: -**

The following guidelines shall be followed for locating the earth electrodes.

An earth electrode shall not be situated less than 1.5 meters from any building

The excavation for electrode shall not affect the column footings or foundation of the buildings. In such cases electrode may be further away from the building.

The location of the earth electrode shall be such where the soil has reasonable chance of remaining moist as far as possible.

Entrance pavements and roadways shall not be used for locating the earth electrode.

#### **NUMBER OF EARTH ELECTRODES**

In all cases relevant provision of rule 33.61 & 67 of the Indian Electricity Rules 1958 as amended shall be complied with.

Metallic covers of supports of all medium apparatus or conductors shall, in all cases be connected to not less than two separate and distinct earth electrodes.

#### **12.5 EARTHING LEADS: -**

The wire earthing leads shall be connected to the Earth Electrode at one end and to the metallic body of the main equipment at the other end. The earthing lead shall connect to the earthing network in the installation

#### **EARTHING LEAD SIZES: -**

Wire earthing leads shall be of copper/GI and as per specifications.

#### **EARTHING LEAD INSTALLATION: -**

The length of buried wire earthing lead shall be in not less than 15 mm G.I. Pipe and shall be buried in trench not less than 0.5m deep.

If conditions necessitates use of more than one earthing lead they shall be laid as widely distributed as possible preferably in a single straight trench or in a number of trenches radiating from one point.

##### **METHOD OF CONNECTING EARTHING LEAD TO EARTH ELECTRODE: -**

In the case of pipe earth electrode the earthing lead shall be securely bolted to the plate with two bolts, nuts check nuts and washers as required.

All materials used for connecting the earth lead with electrode shall be GI in case of GI pipe.

## PROTECTION EARTHING LEAD

The earthing lead from electrode onwards shall be suitably protected from mechanical injury and corrosion.

### **12.6 EARTHING CONDUCTORS**

Earthing conductors shall form the earthing network throughout the installation for earthing of all non-carrying metal parts.

#### **CONNECTION OF EARTHING CONDUCTORS: -**

- a) Main earthing conductors shall be taken from the earth connections at the main switchboard to all other switchboards in the network.
- b) Sub-main earthing conductors shall run from the main switchboard to the sub distribution boards and to the final distribution boards.
- c) Loop earthing conductors shall run from the distribution boards and shall be connected to any point on the main/sub-main earthing conductor, or its distribution board or to an earth leakage circuit breaker.
- d) Switches, accessories, lighting fitting etc shall be effectively connected to the Loop Earthing Conductors.
- e) No joints shall be allowed in the protective conductors. The same must be directly terminated at metallic switch board/distribution boxes
- f) All terminations shall be made on stud's earth terminal blocks with the use of terminating lugs and double check nuts of appropriate sizes.

#### **EARTHING CONDUCTOR INSTALLATION: -**

The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury.

Joints shall be reverted in brazed in approved manner.

Sweated lugs of adequate capacity and size shall be used for termination. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substances and properly primed.

## SIZING OF EARTHING CONDUCTORS

All fan regulators, 5 and 15Amp outlet points, switch boxes shall be earthed with 2.24mm dia. (14 SWG) insulated copper wire. Separate earth wire shall be drawn along with each circuit. From Distribution Board, earth continuity conductor shall be of 6 sq.mm bare G.I. wire. Single phase distribution board shall have one earth continuity conductor while three phase distribution board shall be provided with two earth continuity conductors.

All fixture outlet boxes and junction boxes shall be earthed with suitable size of copper earth wires.

### **12.7 PROHIBITED CONNECTIONS: -**

Neutral conductor, sprinkler pipes or pipes conveying gas water or inflammable liquid structural steel work, metallic enclosures, metallic conduits and lighting protection system conductors shall not be used as a means of earthing an installation or even a link in an earthing system.

### **12.8 RESISTANCE TO EARTH: -**

No earth electrode shall have a greater ohmic resistance than 3 ohms as measured by an approved earth testing apparatuses. In rocky soil the resistance may be up to 5 ohms. The electrical resistance measured between earth connection at the main switchboard and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate fuses or circuit breakers, and shall not exceed 1 ohm.

### **13.0 ROUTINE AND COMPLETION TESTS: -**

#### **13.1 INSTALLATION COMPLETION TESTS: -**

All the completion of the work, the enter installation shall be subject to the following tests: -

1. Wiring continuity test
2. Insulation resistance test
3. Earth continuity test
4. Earth resistivity test

Besides the above any other test specified by the local authority shall also be carried out. All tested and calibrated instruments for testing labour; materials and incidentals necessary to conduct the above tests shall be provided by the contractor at his own cost.

#### **13.2 WIRING CONTINUITY TEST: -**

All wiring system shall be tested for continuity of circuits, short circuits and earthing after wiring is completed and before installation is energized.

#### **13.3 INSULATION RESISTANCE TEST"-**

The insulation resistance shall be measured between earth and the whole system conductors, or any section there of with all fuses in place and all switches closed and except concentric wiring all lamps in position of both poles of the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it does not exceed 660 volts for medium voltage circuits, where the supply is derived from AC three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 mega ohms divided by the number of points provided on the circuit the whole installation shall not have an insulation resistance tower than one mega ohm.

The insulation resistance shall also be measured between all conductors connected to one phase conductor of the supply and shall be carried out after removing all metallic connections between the two poles of the installation and in those circumstances the insulation shall not be less than that specified above.

The insulation resistance between the frame work of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant standard specification or where there is no such specification, shall not be less than half a mega ohm or when PVC insulated cables are used for wiring 12.5 mega ohms divided by the number of outlets. Where a whole installation is being tested a lower value than that given by the above formula subject to a minimum of 1 Mega ohms is acceptable.

#### **13.4 TESTING OF EARTH CONTINITY PATH: -**

The earth continuity conductor including metal conduits and metallic envelopes of cable in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance of earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

**13.5 TESTING OR POLARITY OF NON-LINKED SINGLE POLE SWITCHES: -**

In a two wire installation a test shall be made to verify that all non-linked single pole switches have been connected to the same conductor throughout and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply in the three or four wire installation a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Consultant as well as the local authorities.

**13.6 EARTH RESISTIVITY TEST: -**

Earth resistivity test shall be carried out in accordance with IS Code of practice for earthing IS 3043.

**13.7 PERFORMANCE: -**

Should the above tests not comply with the limits and requirements as above the contractor shall rectify the faults until the required results are obtained. The contractor shall be responsible for providing the necessary instruments and subsidiary earths for carrying out the test. The above tests are to be carried out by the contractor without any extra charge.

**13.8 TEST AND TEST REPORTS: -**

The Contractor shall furnish test reports and preliminary drawings for the equipment to the Consultant for approval before commencing Execution of the equipment. The Contractor should intimate with the tender the equipment intended to be supplied with its technical particulars. Any test certificates etc. required by the local inspectors or any other Authorities would be supplied by the Contractor without any extra charge.

**SPECIFICATIONS FOR SPLIT AC**

- Cooling Capacity (Tonnes) 2.0, 1.5, 1.0
- BEE Star Rating 3 star
- Compressor
- Refrigerant Gas R-22
- Control Console Backlit LCD Panel Remote Control
- Rated Power Supply (V-ph-Hz) 230 Volts – 1ph – 50Hz
- Air Flow Rate (2.0T/1.5T/1.0T) 675 cfm / 550 cfm / 400 cfm

\*\*\* ( Detail specification provided in BOQ – Financial Bid doc – II )

SPECIFICATIONS/BRAND NAMES of HVAC AND AIR COOLING and finished approved by the Architect/Employer are listed in financial bid. However equivalent materials and finished of any other specialized firms may be used , In case it is established that the brands specified below are not available in the market are subject to the approval of the alternative brand by the Architect. alternative brand may be selected.