

# TECHNICAL SPECIFICATIONS & SPECIAL CONDITIONS OF CONTRACT FOR ELECTRICAL WORKS

## CHAPTER 1

### SPECIAL CONDITIONS OF CONTRACT

#### 1.1 General

- 1.1.1 These Special Conditions of Contract supplement the General Instructions, General Conditions of Contract, Bill of Quantities and basic rates and Technical Specifications and tender drawings enclosed thereto, and shall be considered as part of the Tender Papers. Where the provisions of these Special Conditions of Contract are at variance with General Conditions of Contract, the Provisions of these Special Conditions of Contract shall prevail.
- 1.1.2 The several documents forming the tender are to be taken as mutually complementary to one another. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scaled dimensions.
- 1.1.3 If there are varying or conflicting provisions in the documents forming part of the contract, the Engineer-In-Charge shall be the deciding authority with regard to the intentions of the provisions and his decision shall be final and binding on the contractor.
- 1.1.4 The Employer reserves the right to exclude any of the Schedule items on reasons of the rates not being reasonable or subsequent change of design for evaluation of tender and deciding the contract during execution or work.
- 1.1.5 The Contractor may be required to carry out any addition or alteration work other than the specified in the schedule of work / bill of quantities as and when required, by the 'Employer' within the completion period of the project.

#### 1.2 Scope of Work

- 1.2.1 The works to be governed by this contract shall cover delivery and transportation upto destination, safe custody at site, insurance, erection, testing and commissioning of the entire Electrical works.
- 1.2.2 The works to be under taken by the contractor will interalia include the following:
- i) Preparation of detailed 'AS BUILT' drawings of electrical wiring installation, cable laying, erection/fixing of switchgear etc.
  - ii) Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules.

- iii) Warranty obligation for Circuit Breaker, CT, Cables, Capacitor etc to be supplied by the Contractor.
- iv) All other earthwork and masonry works required to be done in connection with the electrical works.

### **1.3 Execution of work**

- 1.3.1 All the works to be carried out as per the approved drawing and direction of the Engineer- In-Charge.
- 1.3.2 Water & Power supply: - It will be provided by IACS free of cost for the beneficial use of IACS only. However, the contractor shall have to arrange for utilizing the same at their cost and risk.

### **1.4 Period of Completion**

- 1.4.1 Time is the essence of contract. Therefore, timely completion of project is very important. Normally no extension of time will be given. However, on account of delay if any, for the reason beyond the control of the contractor, necessary time extension may be granted if applied for by the contractor prior to the expiry of schedule time of completion.
- 1.4.2 No price variations shall be admissible on the contract rate for any item during the entire period of contract including extension periods. *The Contractor shall not have any claim whatsoever in this regard except statutory variation of duties and Taxes imposed by Govt. of India/State Govt subsequent to the offer submitted by the contractor.*

### **1.5 Quality of materials and works**

All the materials to be used in the execution of the contract shall be of the approved quality and of the class most suited for the purpose specified. The work shall also conform to the following Acts, Rules and Orders:

- i) Indian Factories Act
- ii) Indian Electricity
- iii) National Building Code
- iv) National Electrical Code
- v) Indian Standard Specifications

- 1.5.1 All erection work shall be of the best workmanship & quality to the entire satisfaction of the Employer. The Contractor shall ensure that the equipment and services under the scope of this contract whether manufactured or performed within the Contractor's premises or at his subordinate's premises or at the work site or at any other place are strictly in accordance with the provisions of this contract. For this purpose, if necessary the Contractor shall

adopt necessary quality assurance programme to control such activities at all stages.

## **1.6 Electrical License**

1.6.1 The work shall be carried out only by a Contractor holding a valid license issued by the State Government for carrying out the installation work of a voltage classes involved, under the direct supervision of the persons holding valid certificates issued or recognized by the State Government. The tenderer should furnish with his tender the particulars of the license with validity period held by him. The successful tenderer shall furnish the names and particulars of certificates of competency of supervisors and workmen to be engaged for carrying out this work.

**1.6.2 The contractor shall not be allowed to engage sub-contractor directly or indirectly unless it is officially permitted by IACS.**

## **1.7 Inspection**

1.7.1 The Contractor shall provide without any extra cost to the Employer all materials, equipment, tools, labour and maintenance of every kind which the Employer's Inspecting Engineer may consider necessary for any test and examination to be made at the Contractor's or the Sub-Contractor's (if approved) premises and at site and shall pay all cost attended thereon.

1.7.2 All the equipment and materials shall be tested / inspected by the Employer or its authorized Inspecting Engineer and approved before they are installed / used in the execution of the works covered in the contract. If the Contractor uses any equipment / materials without the prior approval of Employer, those are liable to be rejected. The Contractor shall furnish, as and when demanded by the Engineer-in-Charge the T.C. (Test Certificate) and G.C (Guarantee Card) for verification of quality and make of the materials.

1.7.3 The Inspecting Engineer or his authorized Representative shall have at all times access to the Contractor's premises and shall have the power to

- i) Inspect and examine the materials and workmanship of the work at any time at the site of erection
- ii) Reject any part of the work submitted by the Contractor as not being in accordance with the contract.
- iii) Reject the whole of the work including equipment tendered for inspection if after the inspection of such portion as he may, in his discretion think fit he is justified that the same is unsatisfactory.
- iv) Mark the rejected equipment with a rejection mark so that the same may be easily identified

- v) Re-inspect at the time of erection at site any equipment both previously inspected and approved by the inspecting Engineer at the Contractor or Sub-contractor's (if approved) premises. Notwithstanding any approval given earlier, the Contractor shall make good such rejections made based on such re-inspection at site to the satisfaction of the Engineer.
- vi) The decision of the Inspecting Engineer as regards to the acceptance or rejection of equipment / work shall be final and binding to the Contractor.

#### 1.7.4 Consequence of Rejection

On the equipment / assemblies being rejected by the Inspecting Officer of the Employer at destination of the Contractor shall replace such rejected equipment/assemblies of the forthwith but in any event not later than a period of 2 (two) weeks in the case of minor equipment and 4(four) weeks in case of a major equipment from the date of rejection. The Contractor shall bear all the costs of replacement including freight, etc., but without being entitled to any extra time on this account. The decision as to whether the equipment is to be classified as Minor or Major for the purpose of this clause shall be that of an Engineer and is not questionable.

### 1.8 Installation

- 1.8.1 All works connected with and inclusive of installation and erection under this contract shall be done in accordance with the standard and established methods of installation and erection of electrical equipment and shall comply with relevant Indian Electricity Rules, National Electrical Code, BIS Codes of Specifications and Standards. The work shall also be strictly in accordance with the instructions / recommendations of the manufacturers. **The equipment shall be leveled carefully before being fixed finally in position. All fragile and sensitive equipment shall be protected adequately and handled carefully during installation and erection.**

### 1.9 Commissioning Tests

- 1.9.1 As soon as the installations are ready for commissioning, the Contractor shall arrange for all the tests/ inspection as required by the relevant ISS and / or IE Rules and advise the Employer and others concerned. Employer shall depute their Inspecting Officer for witnessing the tests and to carry out inspection independently and also jointly with other concerned agencies where ever necessary and only after the installation passes the required tests and inspection, it should be commissioned / energized. The contractor shall arrange all testing equipments/apparatus/instruments as will be required for conducting the tests without any extra cost.

- 1.9.2 Visual Inspection shall include checks for satisfactory workmanship, all connections, painting, cleanliness of all fittings etc., and compliance with Indian Electricity Rules.
- 1.9.3 The ammeters, voltmeters and energy meters shall be checked for their calibration, scale, accuracy, etc. for compliance with the specified requirement.
- 1.9.4 (i) Manufacturer's test Certificates shall be furnished on demand.  
(ii) Certificates of compliance to routine test shall also be furnished.  
(iii) Routine tests certificates are required to be submitted.
- 1.9.5 All cables shall be tested at manufacturer's works in compliance with relevant ISS. All cables and connections after erection shall be tested as required by the employer for :
- i) Pressure Test
  - ii) Insulation Resistance Test
- 1.9.6 Earth resistant shall be measured separately for each earth electrode and when they are connected together and to the equipment should be recorded.

**2.0 Warranty:** - The contractor shall stand guarantee that all the equipments and the works executed under this contract shall be free from all defects and faults in materials, design, workmanship and manufacture and shall be acceptable standards for the contracted works and in full conformity to the technical specifications, drawings and other contract stipulations for a period of 12 months from the date of completion of the project or **15** months from the date of supply of materials whichever is earlier.

**3.0 Completeness of tender:** -

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various component of the work shall be deemed to have been included in the tender whether such items are specifically mentioned in the tender documents or not.

**4.0 Works to be done by the Contractor:** - Unless and otherwise mentioned in the tender documents, the following work shall be done by the contractor, and therefore, their cost shall be deemed to be included in their tender cost

- i) Cutting and making goods all damages caused during installation and restoring the same to their original finish.
- ii) Sealing of all floor openings provided by him for pipes and cables from fire safety point of view after laying of the same
- iii) Painting at site of all exposed metal surfaces of the installation other than pre-painted items like switch-gear, transformer etc. damages to

finished surfaces of these items while handling and erection shall however be rectified to the satisfaction of the Engineer In-Charge.

**5.0** Tools for handling and erection: - all tools and tackles required for handling of equipments and materials at site of works as well as for their assembly and erection and also necessary testing instruments shall be responsibility of the contractor.

**6.0 Care of Building:**

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

**7.0 Structural Alterations to Buildings**

- i) No structural member in the building shall be damaged / altered, without prior approval of the competent authority through the Engineer-in-charge.
- ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the Contractor at his cost.
- iii) All such openings in floors provided by the Department shall be closed by the Contractor after installing the cables / conduits / rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.
- iv) All chases required in connection with the electrical works shall be provided and filled by the Contractor at his own cost to the original architectural finish of the buildings.

**8.0** Any concealed work must be given enough opportunity for inspection by the employer and after clearance of the said work concealment can be done

**CHAPTER 2**

**TECHNICAL SPECIFICATION**

**1.0 Conformity to IE Act, IE Rules, and Standards:**

- i) All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 1910 and Indian Electricity Rules, 1956 amended up to date.
- ii) The works shall also conform to relevant Indian Standard Codes of Practice (COP) for the type of work involved.

- iii) In all electrical installation works, relevant safety codes of practice shall be followed.
- iv) **Unless otherwise specified, the work shall be carried out as per CPWD General Specifications for Electrical Works (Internal & external) as applicable as per the instruction of the Engineer-in-Charge or his authorized representative.**

## **2.0 Workmanship :**

- i) Good workmanship is an essential requirement to be complied with. The entire work of manufacture / fabrication, assembly and installation shall conform to sound engineering practice involving highly skilled workers.
- ii) The work shall be carried out under the direct supervision of a highly experienced licensed SUPERVISOR, i.e. a person holding a certificate of competency issued by the State Govt. for the type of work involved, employed by the contractor, who shall rectify the defects pointed out by the Engineer-in-charge during the progress of work.

## **3.0 General requirements and components: -**

- i) **Quality of Materials: -**
  - a) All the materials and equipments supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated condition of operation and to withstand the environmental conditions at site.
  - b) All the components shall conform to relevant IS specification wherever existing. Materials with ISI certification marked shall be preferred if not otherwise mentioned the tender.
  - c) For items of materials for which makes are approved by the Dept., only such approve makes shall be permitted in the work in accordance to the preference of the Engineer-in-Charge of the employer.
  - d) **Commissioning on completion:** Before the workman leaves the work finally, the contractor must be sure that the installation is ready for commissioning after due testing.

## **4.0 Completion plan and completion certificate**

- i) For all the works, completion certificate after completion of work as given in '**Appendix-A**' shall be submitted to the Engineer In-Charge.
- ii) 'As built' drawing to be submitted along-with Test/completion certificate which is an essential part for consideration of final bill.

**5.0 Testing & Installation: -**

On completion of installation, the following tests shall be carried out: -

- i) Insulation Resistance Test by appropriate class of Megger
- ii) Earth continuity test
- iii) Earth resistant test by earth Megger.

Testing shall be carried out for the completed installation in presence of the E-in-C or his authorized representative to their satisfaction. All test result shall be recorded and submitted to the Dept. All necessary test instruments for the test shall be arranged by the Contractor if so required by the E-in-C. Calibration certificates may require to be produced on demand by the E-in-C

**6.0 Testing of Earth Continuity Path**

The earth continuity conductor, including metal conduits and metallic enclosures of cables in all cases, shall be tested for electric continuity. The electrical resistance of the same along-with the earthing lead, but excluding any added resistance, or 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.

**Appendix A**

**Form of Completion Certificate**

I/We certify that the installation detailed below has been in by me/us and tested and that to the best of my/our knowledge belief it complies with Indian Electricity Rules, 1956,

Electrical \_\_\_\_\_ installation \_\_\_\_\_ at \_\_\_\_\_

Voltage \_\_\_\_\_ and \_\_\_\_\_ system \_\_\_\_\_ of \_\_\_\_\_ supply \_\_\_\_\_

1. Particulars of work:

- a) Internal Electrical Installation



	No.	Total Load	Type or system of wiring
i)	Light point		
ii)	Socket point		
	a) 5pin 5 Amp.		
	b) 6 pin 15 Amp.		
	b) Others		
2.	Earthing: -		
	i) Description of earthing electrode		
	ii) Number of earth electrode		
	iii) Size of main earth lead		
3.	Test results :		
	a) Insulation resistance		
	i) Insulation resistance of the whole system of conductors to earth		Megaohms
	ii) Insulation between the phase conductor and neutral		
	Between Phase R and neutral		Megaohms
	Between Phase Y and neutral		Megaohms
	Between Phase B and neutral		Megaohms
	iii) Insulation resistance between the phase conductors in case of polyphase supply.		
	Between Phase R and Phase Y		Megaohms
	Between Phase Y and Phase B		Megaohms
	Between Phase B and Phase R		Megaohms
	b) Earth continuity test- Maximum resistance between any point of the earth continuity conductor including metal conduits and main earthing leads		
	Ohm		

- c) Earth Electrode Resistance  
Resistance of each earth electrode
- i).....Ohm
  - ii).....Ohm
  - iii).....Ohm
  - iv).....Ohm

Signature and name of  
the Supervisor along with  
license no., SCC Part nos. & validity

Signature and Name of the  
Contractor along with License  
number & validity

## LIST OF APPROVED MAKES FOR EI WORKS

1.	MCCB	L&T/ABB/Legrand
2.	MCB/MCB DB	Legrand/Hagger's/ABB
3.	TPN Switches & HRC Fuses	L&T /Siemens / GE Power Controls
4.	PVC rigid conduit & accessories	Precision/AKG
5.	Modular type switch & socket	Crabtree/Roma/ABB
6.	Light fixtures & lamps	PHILIPS/WIPRO
7.	Cables a) Upto 1.1KV grade b) Above 1.1KV grade	CCI/Universal/Polycab/NICCO
8.	PVC Insulated Copper wire	FINOLEX/NICCO/KDK
9.	Cable Lugs	Dowell's

**NOTE:**

The makes of material to be used shall be strictly as per choice of Client / Consultant which shall be binding on the contractor. For any item, if no make is mentioned, it will be considered to be ISI marked only.