

**CHAPTER 30 : ERECTION OF ELECTRICAL EQUIPMENTS****1.00.00 SCOPE OF WORK**

1.01.00 The scope of work shall cover complete and efficient Erection, Testing and Commissioning and putting into successful commercial operation of all Outdoor and Indoor electrical equipment ~~supplied under Power Plant EPC Package covering Power House Building, Transformer Yard & Mill Building, CW Pump House, Fuel Oil Pressuring Pump House, Plant Water System, Coal Handling, Ash Handling Plant, Chimney, IDCT, Air Compressor, Buildings & Areas & Interfacing etc as specified.~~

1.02.00 The scope of work shall also include minor civil (grouting, chipping etc.) works necessary for successful installation and commercial operation of all electrical equipment to be erected under this specification.

**2.00.00 SCOPE OF SUPPLY**

2.01.01 The work involves timely procurement and transportation to site in properly packed condition of all hardware, materials and miscellaneous items required to complete the erection job under this specification.

Miscellaneous steel structures, tray supports, hangers & brackets for cable trays, mounting of local panels, push button stations etc. shall be supplied. Any material or accessory, which may not have been specifically mentioned but which is usual and / or necessary shall be supplied.

2.01.02 All hardware, materials and accessories to be supplied by the Bidder shall be brand new ones of reputed make.

2.01.03 Spare Parts

2.01.04 All relevant drawings, data sheet and technical leaflets on each piece of devices.

**2.02.00 SCOPE OF SERVICE** REFER BOQ FOR DETAILS

The work includes but is not limited to the followings:

2.02.01 Furnishing of all erection tools and tackles, testing equipment, implements, supplies, consumables and hardware for timely and efficient execution of the erection work. Hydraulic jacks or motorized jacks necessary for lifting of heavy equipment shall be provided by the contractor.

2.02.02 Transport vehicles necessary for efficient transportation of equipment from Owner's stores to site of erection and excess materials back to owner's stores.

2.02.03 Complete assembly, erection and connection, testing and commissioning, putting into successful and satisfactory commercial operations of the Outdoor and indoor Electrical Equipment and accessories listed below but not limited to:

(a) Power Plant System

- ~~(i) Generator Transformer~~
- ~~(ii) Unit Transformers & Unit Aux Transformers~~
- ~~(iii) Station Transformers & Station Aux Transformers~~
- (iv) L.T. Transformers

- (v) Lighting Transformers
- (vi) Stringing and Connections
- ~~(vii) Neutral Grounding Resistor Cubicles~~
- ~~(viii) General Busduct and Auxiliary equipment~~
- ~~(ix) 3.3 kV & 11kV Busduct~~
- (x) 415V Busduct
- ~~(xi) 11 kV Switchgear~~
- ~~(xii) 3.3kV Switchgear~~
- (xiii) 415V Switchgears, Switchgear cum MCCs
- (xiv) Motor Control Centres, A.C/ D.C. Distribution Boards, Main Lighting Distribution Boards and Miscellaneous items.
- (xv) Battery and Battery chargers and DCDB.
- (xvi) Electrical Control Panels, Relay Panels, Data logger Panels etc.
- (xvii) Miscellaneous Local Panel
- (xviii) Illumination system
- (xix) 11 kV & 3.3 kV Power cable, 1.1 kV Power & Control Cables, FS Power and Control cables, special cables including cabling system.
- (xx) Complete Switchyard
- (xxi) All electrical equipment and systems integral with mechanical equipment, systems and sub-systems.
- (xxii) DG set

- 2.02.04 The complete erection work shall be carried out in a phased manner. A schedule of the work showing the sequence of erection shall be submitted by the Bidder for this purpose.
- 2.02.05 The erection schedule, as approved by the Owner's Engineer shall be strictly followed by the contractor. If, for any reason beyond the control of the Contractor, the work is held-up then the Contractor shall bring it to the notice of the Owner's Engineer without any delay
- 2.02.06 All erection work of equipment shall be carried out in a neat and efficient way so as not to impair their normal functioning in any way.
- 2.02.07 The pre-commissioning checks as well as commissioning of different equipment shall be carried out as per guidance of actual manufacturer's supervisor and or as per written instructions in Erection manuals. In case of any site related problem in commissioning activities, contractor shall seek advice of owner's engineers.
- 2.02.08 All erection work under this specifications shall be carried out strictly in accordance with the approved drawings.
- 2.02.09 In order to avoid concentration of stresses, all sharp edges of clamps, connectors etc. shall be rounded off.

### 2.03.00 METHOD AND WORKMANSHIP

- 2.03.01 All work shall be installed in a first class, neat workmanlike manner by mechanics / electricians skilled in the trade involved.
- 2.03.02 The erection work shall be supervised by competent supervisors holding relevant supervisory license from the Government.
- 2.03.03 All details on installation shall be electrically and mechanically correct.



2.03.04 The installation shall be carried out in such a manner as to preserve access to other equipment installation.

In order to avoid concentration of stresses, all sharp edges of clamps, connectors etc. shall be rounded off.

#### **2.04.00 CONSUMABLES AND HARDWARE**

2.04.01 The Contractor shall furnish all erection materials, hardware and consumables required for the completion of the installation

2.04.02 The materials shall include but not be limited to the following:

- (a) Consumables : Welding rods & gas, oil and grease, cleaning fluids, paints, electrical tape, soldering materials etc.
- (b) Hardware : Bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims etc.
- (c) Materials : Junction boxes, terminal blocks, connectors, ferrules, lugs, brass glands, rigid/flexible conduits, cables, ground wires etc.

2.04.03 Supply of cement, sand, stone etc. required for the execution of the contract shall be the responsibility of the Contractor.

#### **2.05.00 TESTING EQUIPMENT**

2.05.01 The major testing equipment that are required to be provided by the Contractor are listed below:

- (a) Insulation Tester : (i) Power Operated Megger – 1 kV and 10 kv Grade  
(ii) hand Operated Megger - 1kv Grade
- (b) Hand driven earth Resistance Meggar, range 0-1/3/30 Ohms
- (c) high Potential testing Set – roller mounted type for LV, HV & EHV Equipment.
- (d) Tong testers of suitable ranges
- (e) Contact resistance measuring set of Micro-ohms
- (f) Torque wrench of various sizes
- (g) Multi-meters, test lamp, field telephone with buzzer set, spirit level, different gauges etc.
- (h) Insulating oil testing set of range 0-60kV.
- (i) Stream line filter for transformer
- (j) Current Transformer for primary injection set
- (k) Relay testing and checking bench

2.05.02 Other test equipment as required will be arranged by the contractor.

## **2.06.00 INSTALLATION – GENERAL**

2.06.01 Installation work shall be carried out in accordance with good engineering practices and also manufacturer's instructions/ recommendations where the same are available.

2.06.02 Equipment shall be installed in a neat workmanlike manner so that it is level, plumb, square and properly aligned and oriented.

2.06.03 All erection work shall be carried out in strict compliance with manufacture's instructions and shall include all necessary adjustments, checks and measurements.

2.06.04 All internal wiring of the equipment which has been left incomplete because of shipping split or which requires minor modifications shall be carried out by the contractor.

2.06.05 The contractor shall record results of all erection tests and measurements. The contractor shall submit copies of those test results to the Owner for his reference and record.

2.06.06. High voltage test of transformer oil shall be carried out taking samples from individual transformer and also from each insulating oil drum. If the result of di-electric test is not to the satisfaction of the engineer, oil filtration, heat run and conditioning shall be carried out for the concerned transformer to improve the dielectric strength of oil and insulation to the acceptable value.

2.06.07 The storage and installation of transformer with all its accessories shall be carried out in strict compliance with manufacturer's instructions. Extreme care shall be taken to avoid ingress of moisture and foreign practicals into the transformer tank.

## **2.07.00 STEEL FABRICATION**

2.07.01 All racks, supports, hangers and brackets wherever necessary shall be fabricated by the contractor.

2.07.02 Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edges.

## **2.08.00 PAINTING**

2.08.01 The Contractor shall paint all racks, supports and miscellaneous steel fabrication with two (2) coats of red oxide primer and two (2) coats of synthetic enamel paint of approved shade (say battle ship grey IS shade # 632)

## **2.09.00 FOUNDATION & CIVIL WORKS**

2.09.01 **DELETED**

2.09.02

**DELETED**

2.09.03

All final adjustment of foundation levels, chipping and dressing of foundation surfaces, setting and grouting of anchor bolts, sills, inserts and fastening devices shall be carried out by the contractor including minor modification of civil work as may be required for erection.

**2.10.00 CLEANING UP OF WORK SITE**

2.10.01

The Contractor shall, from time to time, remove all rubbish resulting from execution of his work. No materials shall be stored or placed on passage or drive ways.

2.10.02

Upon completion of work, the Contractor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials etc. to leave the premises clean and fit for use.

**3.00.00 TESTS****3.01.00 SITE TESTS**

3.01.01

Contractor shall thoroughly test and megger all cables, wires and equipment to prove the same are free from ground and short circuit after erection and installation at site.

3.01.02

If any ground or short circuit is found the fault shall be rectified or the cable and / or equipment replaced.

3.01.03

AL equipment shall be demonstrated to operated in accordance with the requirements of this specification

3.01.04

All equipment shall be subject to High Potential test.

3.01.05

All protective relays shall be checked for correctness of operations.

3.01.06

All current transformers shall be subjected to Primary Injection test.

3.01.07

Generator Bus-duct Polarisation Index (P.I. value) shall be measured.

**3.02.00 PRE-COMMISSIONING TESTS AT SITE**

3.02.01

The installation of different type of equipment and accessory shall be tested by the contractor after completion of his erection work with an advance notice to the Engineer concerned so that he may witness the same also.

3.02.02

The test result of any installation or equipment or its parts, if considered unsatisfied to the Engineer, the concerned installation / equipment and its accessories shall be properly rectified and tested again to the satisfaction of the Engineer by the Contractor at his own cost.

3.02.03

The site tests to be carried out by the contractor on completion of installation / erection of equipment are broadly listed below for ready reference of contractor.

- 3.02.04 The major testing equipment which will be necessary for carrying out pre-commissioning tests at site are already listed in this specification.