

# SECTION-II

## GENERAL TECHNICAL CONDITIONS

TECHNICAL SPECIFICATIONS

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## TECHNICAL SPECIFICATIONS

### SECTION-II

#### GENERAL TECHNICAL CONDITIONS

#### 1.1 General Technical Conditions

##### 1.1 General

The following provisions shall supplement all the detailed technical specifications and requirements brought out herein. The contractor's submission shall be based on the use of materials complying fully with the requirements specified herein.

##### 1.2 Drawings

1.2.1 All relevant standard drawings for all the towers/ stubs and their extensions shall be furnished to the Contractor by the Employer which shall include structural drawings/erection drawings and/ or shop fabrication drawings, Bill of Materials for all the towers and their extensions as well as construction drawings for foundations.

1.2.2 The tower members can be directly fabricated from the structural/erection drawings wherever the required fabrication details are provided on the same or shop fabrication drawings. However, if the contractor is required to prepare shop fabrication drawings, of their own, in addition to the structural/ erection drawings with required fabrication details, they may prepare the same without any additional financial implication to Employer.

1.2.3 Apart from the standard drawings mentioned above, some other drawings and documents, such as BOM, Shop drawings, structural drawings for towers/extensions/Auxiliary cross-arms may need to be developed based on single line diagram given by the Employer, which are required for the project. These drawings, BOM, shop sketches shall be developed by the Contractor. However, no extra cost on this account shall be payable to the Contractor.

1.2.4 After development, these drawing shall be submitted to the Employer for approval. In ordinary circumstances, the contractor should submit these drawings for approval within 15 days of receipt of the single line drawing from the employer.

1.2.5 Such drawings/ documents developed by the Contractor shall necessarily have sufficient detail to indicate the type, size, arrangement, dimensions, material description, Bill of Materials, weight of each component break-up for packing and shipment, fixing arrangement required, the dimensions required for installation and any other information specifically requested in the specifications.

- 1.2.6 Each drawing developed by the Contractor shall be clearly marked with the name of the Employer, the specification title, the specification number and the name of the Project. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be to the scale and in S.I. units.
- 1.2.7 The drawings submitted by the Contractor shall be reviewed by the Employer as far as practicable within 15 days and shall be modified by the Contractor if any modifications and/or corrections are required by the Employer. The Contractor shall incorporate such modifications and/or corrections and submit the final drawings for approval. Any delays arising out of failure by the Contractor to rectify the drawings in good time shall not alter the contract completion date.
- 1.2.8 The drawings submitted for approval to the Employer shall be returned to the Contractor by the Employer after review. The contractor shall there upon furnish the Employer revised drawings, as may be required, after incorporating all corrections.
- 1.2.9 The work shall be performed by the Contractor strictly in accordance with the standard/approved drawings and no deviation shall be permitted without the written approval of the Employer, if so required.
- 1.2.10 All manufacturing, fabrication work under the scope of Contractor, prior to the approval of the drawings shall be at the Contractor's risk. The contractor may incorporate any changes in the design, which are necessary to conform to the provisions and intent of the contract and such changes will again be subject to approval by the Employer.
- 1.2.11 The approval of the documents and drawings by the Employer shall mean that the Employer is satisfied that:
- (a) The Contractor has completed the part of the Works covered by the subject document (i.e. confirmation of progress of work).
  - (b) The Works appear to comply with requirements of Specifications.
- In no case the approval by the Employer of any document does imply compliance with all technical requirements or the absence of errors in such documents.
- If errors are discovered any time during the validity of the contract, then the Contractor shall be responsible for consequences.
- 1.2.12 All drawings shall be prepared using AutoCAD/ZWCAD/any other drawing preparation software. After final approval all the drawings (structural drawings, BOMs and shop sketches shall be submitted to the Employer (in PDF & '.DWG' format).

- 1.2.13 The following is the general list of the documents and drawings that are to be approved by the Employer.
- a) Work Schedule (Master Network) Plan.
  - b) Detailed survey report and profile drawings showing ground clearance and tower locations (as applicable).
  - c) Tower schedule and foundation classification for individual tower locations.
  - d) All drawings/ documents which are developed by the contractor based upon the single line drawing given by the Employer.
  - e) Soil Investigation report.
  - g) Tower footing earthing drawing.
  - i) Stringing procedure.
  - j) Tower accessories drawings like danger plate, name plate etc.
  - k) Quality plans for fabrication and site activities including Quality System.
  - l) Sub-vendors approval.
  - m) Line material drawings.
  - n) Type test report for line materials.
- 1.2.14 All rights of the design/ drawing for all types of towers shall be strictly reserved with the Employer only and any designs/ drawings/ data sheets submitted by the contractor from time to time shall become the property of the Employer. Under no circumstances, the Contractor shall be allowed to user/ offer above designs/ drawings/ data sheets to any other authority without prior written permission of the Employer. Any deviation to above is not acceptable and may be a cause for rejection of the bid.
- 1.3 **Design Improvements**
- The Employer or the Contractor may propose changes in the specification and if the parties agree upon any such changes and the cost implication, the specification shall be modified accordingly.
- 1.4 **Design Co-ordination**
- Wherever, the design is in the scope of Contractor, the Contractor shall be responsible for the selection and design of appropriate material/item to provide the best coordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various

components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

**1.5 Design Review Meeting**

The contractor may be called upon to attend design review meetings with the Employer, and the consultants of the Employer during the period of Contract. The contractor shall attend such meetings at his own cost at the Corporate Office of the Employer or at mutually agreed venue as and when required.

**1.6 Engineering Data**

1.6.1 The furnishing of engineering data by the Contractor shall be in accordance with the Schedule as specified in the Bidding Document. The review of these data by the Employer will cover only general conformance of the data to the specifications and not a thorough review of all dimensions, quantities and details of the materials, or items indicated or the accuracy of the information submitted. This review by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications.

1.6.2 All engineering data submitted by the Contractor after review by the Employer shall form part of the contract document.

**1.7 Employer's Supervision**

1.7.1 To eliminate delays and avoid disputes and litigation to the Contract, all matters and questions shall be resolved in accordance with the provisions of this document.

1.7.2 The manufacturing of the product shall be carried out in accordance with the specifications. The scope of the duties of the Employer, pursuant to the contract, will include but not be limited to the following:

- a) Interpretation of all the terms and conditions of these Documents and Specifications.
- b) Review and interpretation of all the Contractor's drawings, engineering data etc.
- c) Witness or authorize his representative to witness tests at the manufacturer's works or at site, or at any place where work is performed under the contract.
- d) Inspect, accept or reject any equipment, material and work under the Contract, in accordance with the Specifications.
- e) Issue certificate of acceptance and/or progressive payment and final payment certificate.

- f) Review and suggest modification and improvement in completion schedules from time to time, and
- g) Supervise the Quality Assurance Programme implementation at all stages of the works.

## 1.8 Tests

1.8.1 The type, acceptance and routine tests and tests during manufacture shall be carried-out on the material and shall mean as follows:

1.8.2 **Type Tests** shall mean those tests which are to be carried out to prove the process of manufacture and general conformity of the material to this Specification. These tests shall be carried out on samples prior to commencement of commercial production against the order.

1.8.3 **Acceptance Tests** shall mean those tests which are to be carried out on samples taken from each lot offered for pre-dispatch inspection, for the purposes of acceptance of that lot.

1.8.4 **Routine Tests** shall mean those tests, which are to be carried out on the material to check requirements which are likely to vary during production.

1.8.5 **Tests during Manufacture** shall mean those tests, which are to be carried out during the process of manufacture and end inspection by the Contractor to ensure the desired quality of the end product to be supplied.

1.8.6 The norms and procedure of sampling for these tests will be as per the Quality Assurance Programme to be mutually agreed to by the Contractor and the Employer.

1.8.7 The standards and norms to which these tests will be carried out are listed against them. Where a particular test is a specific requirement of this Specification, the norms and procedure of the test shall be as specified in **Annexure-A** of the relevant section or as mutually agreed to between the Contractor and the Employer in the Quality Assurance Programme.

1.8.8 For all type and acceptance tests, the acceptance values shall be the values specified in this Specification or guaranteed by the Bidder, as applicable.

1.8.9 In case of any failure or defect/ deficiency observed in material supplied Employer reserves the right to carry out any tests on the material supplied to site, if required to prove conformity of material to the specification for which testing charges shall be borne by contractor/ manufacturer.

## 1.9 Standard Technical Particulars

1.9.1 The Standard Technical Particulars of the various items are given in the relevant schedule of the specification, the bidder is required to comply with the same.

**1.10 Packing**

1.10.1 All the materials shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

1.10.2 The Contractor shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during transport by air, sea, rail and road.

1.10.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'up' and 'down' on the sides of boxes, and handling and unpacking instructions as considered necessary. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea.

1.10.4 The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols, i.e. fragile, handle with care, use no hook etc. wherever applicable.

1.10.5 Each package shall be legibly marked by the Contractor at his expenses showing the details such as description and quantity of contents, the name of the consignee and address, the gross and net weights of the package, the name of the Contractor etc.

1.10.6 Angle section shall be wire bundled.

1.10.7 Cleat angles, gusset plates, brackets, fillet plate, hanger and similar loose pieces shall be tested and bolted together in multiples or securely wired through holes.

1.10.8 Bolts, nuts washers and other attachments shall be packed in double gunny bags accurately tagged in accordance with the contents.

1.10.9 The packing shall be properly done to avoid losses & damages during transit. Each bundle or package shall be appropriately marked.

**1.11 Storage of Material under Transmission Line Package**

Brief guidelines including typical drawing for storage of different type of construction material used in the transmission line projects are as under:

**1.11.1 Cement Storage**

Cement received at site should be stored in a building or shed which is dry, leak proof and moisture proof. The building should have minimum numbers of windows. Cement bags stored and stacked off the floor on wooden planks in such

a way so as to keep about 150 mm to 200 mm clearance from the ground. The floor may be of lean cement concrete or two layers of dry bricks laid on well consolidated earth. A minimum space of 600 mm shall be kept around and between the exterior walls and the stacks. In stacks, bags shall be kept close together to reduce air circulation. The height of the stack shall not be more than 12 bags and the width of the stack shall not be more than four bags or 3 meters. For extra safety during monsoon, or when it is expected to store for an unusually long period, the stack shall be completely enclosed by a waterproofing membrane such as polyethylene etc. Different type and make of cement shall be stacked and stored separately.

#### **1.11.2 Aggregates**

Aggregates shall be stored at site on a hard dry and level patch of ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or floor bricks or a thin layer of lean concrete shall be made so as to prevent contamination with clay, dust, vegetable and other foreign matter.

The stacks of fine and coarse aggregates shall be kept in separate stock piles sufficiently removed from each other to prevent the material at the edges of the piles from getting intermixed. Fine aggregate shall be stacked in a place where loss due to the effect of wind is minimum.

#### **1.11.3 Reinforcement Steel**

For each classification of steel, separate areas shall be earmarked. It is desirable that ends of bars and sections of each class be painted in distinct separate colors. Steel reinforcement shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. It is desirable to coat reinforcement with cement wash before stacking to prevent scaling and rusting in case of storage time exceeding one month. In store, reinforcement bars shall be stacked above ground level by at least 150 mm either on brick/ cement/ stone platform or concrete/bricks planks.

#### **1.11.4 Structural Steel for Tower Parts**

The structural steel of different classification, sizes and lengths shall be stored separately. These shall be stored above ground level at least 150 mm upon platforms, skids or any other suitable supports to avoid any distortion of sections. Also, in order to prevent white rust formation sufficient care should be exercised while storing, handling and transporting galvanized products. The structural steel/ tower parts shall be stored in an adequately ventilated area. The article shall be stored with spacers in between them and kept at an inclination to facilitate easy drainage of any water collected on the structural steel/ tower parts.

### 1.11.5 Conductor & Earthwire Drums

It is essential to save the conductor drums from damage during storage and transportation and the wooden battens and main wheel should be intact so that same can be successfully mounted on the conductor jacks to release the conductor during stringing. All the conductor and earthwire drums should be stored on a proper hard platform above ground to avoid deterioration of the drum and further avoiding the damage of conductor. The conductor & earthwire drums should be stored in such a manner that each drum can be accessed at any time for inspection purposes.

### 1.11.6 Hardware fitting, Accessories & Insulators

All the hardware fittings, accessories and insulators should be stored on raised platform above ground so as not to damage the packaging and to avoid further damage or denting on the fittings and chipping of insulators. All the aluminum parts should be stored on a plain/ raised platform under a cover shed in such a way that the aluminum fittings cannot be distorted during storage.

## 2.0 Employer's Environment and Social Policy and its Implementation

2.1 Development and growth of mankind through Industrialization and unwarranted use of natural resources has inflicted considerable impact on Environment and Society. As a result, Environmental and Social issues have emerged as the focal point of global debate.

Employer's activities by their inherent nature and flexibility have negligible impacts on environmental and social attributes. In order to address these issues and to match the rising expectations of a cleaner, safer and healthier environment, Employer has evolved its Environmental and Social Policy and Procedures (ESPP). The key principles of Employer's Environmental and Social Policy are: -

- i) Avoidance of environmentally and socially sensitive areas while planning project activities.
- ii) Minimisation of impacts when project activities occur in environmentally and socially sensitive areas.
- iii) Mitigation of any unavoidable adverse impacts arising out of its projects.

2.2 Basic issues to be kept in mind while carrying out construction activities are to

- i) Avoid socially sensitive areas with regard to human habitations and areas of cultural significance.
- ii) Secure the interest of people affected by Employer's projects.
- iii) Involve local people affected by transmission line projects as per requirement and suitability.

- iv) Consult affected people in decisions having implication to them if considered necessary.
  - v) Apply, efficient and safe technology/ practices.
  - vi) Keep abreast of all potential dangers to people's health, occupational safety and safety of environment and the respective mitigatory measures.
  - vii) Establish preventive mechanisms to guarantee safety.
  - viii) Mitigation measures in case of accidents.
  - ix) Avoid unwarranted cutting of trees in forest area.
- 2.3 While constructing the lines through forest stretches the contractor will provide alternate fuel to its employee e.g. working labours/ supervisors etc. in order to avoid cutting of forest woods.
- 2.4 Contractor will ensure safety to the wild life, during working/ camping near to the National park.
- 2.5 Contractor during construction of lines in agricultural fields will ensure minimum damages to the crops, trees, bunds, irrigation etc. If the same is un-avoidable, the decision of Engineer- in-charge shall be final.
- 2.6 The waste/ excess material/ debris should be removed from the construction site including agricultural field, forest stretches, river etc. immediately after construction work.
- 2.7 The Contractor will ensure least disturbance to the hill slope and natural drainage so as to avoid soil erosion. Natural drainage in plain area if disturbed is to be trained to the satisfaction of Engineer- in-charge.
- 2.8 As far as possible existing path/ kutchha road/ approach shall be used for the construction.
- 2.9 The Contractor will ensure supply of stone chips/sand from authorised/ approved quarry areas.
- 2.10 Proper documentation of above, if any.
- 2.11 The Environment & Social Policy and Procedures (ESPP) evolved by POWERGRID is available at the POWERGRID's website, [www.powergrid.in](http://www.powergrid.in), which shall be referred by the Bidder for further information.

## 2.12 Facilities to be incorporated for labourers

The Contractor shall provide his/ their laborer with sufficient number of the following facilities with the indicated specifications:

### A) Tents:

- i) Tent should be with double layer canvas, outer layer being water-proof. The number of tents should be sufficient to accommodate required number of labourers comfortably.
- ii) The preferred size of tent should be 20ft x 20ft with Centre height of 7 ft and side height of 2.5 ft, accommodating a maximum number of ten (10) labourers in a single tent.
- iii) Tent windows should have arrangement for mosquito net with waterproof outer covering.
- iv) Doors of the tents shall have Velcro or any other closing system.
- v) The site selected for the camp shall be on high ground, removed from Jungle.
- vi) Efficient arrangement for draining away stagnant water should be provided so as to keep the camp neat and tidy.
- vii) The tents should have illumination at night by providing battery operated LED lanterns or equivalent lighting system.

**B) Portable (tyre- mounted) Bio toilet**

- i) The toilet seats should be 'Indian'.
- ii) The number of Toilets should be not less than 2 per 50 laborers with separate toilets for female laborers.
- iii) Bio-tank should be of sufficient capacity to allow bacteria present to decompose.
- iv) the excreta and only waste water (odourless and harmless) gets discharged out of the toilet through a sewerage channel away from the tent areas and working areas.
- v) Water tank of adequate capacity should be installed with the Portable Toilet.

**Bidder shall quote for the above facilities in the BPS, wherever indicated.**

**3.0 Quality Assurance Programme**

Enclosed with this Technical Specification as Section-II, Annexure-A (Quality Assurance Programme).