# SOUTHERN POWER DISTRIBUTION COMPANY OF T.G. LIMITED HYDERABAD

# CE/ Operation/Medchal Zone,

# Mint Compound, Hyderabad.

# tgspdcl.jpg

# BID DOCUMENT

**Name of the Work:** Providing of 33KV alternate source of supply to 33/11KV Andole

(new) SS from 132KV/33KV Jogipet EHT Sub-Station by erection

of 33KV interlinking SCOH line with 100sq.mm AAA conductor

for a distance of 10.2KM over now proposed 11Mtrs PSCC Poles

in Andole Section of Jogipet Sub-Division of Jogipet Division in

Sangareddy Circle under T&D Improvements to original works

**Tender Specification No: CE/OP/Medchal Zone–39/25-26.**

Issued to Sri/Smt. M/s. ---------------------------------------------------------------

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Chief Engineer/Operation,

Phone: 040 – 23431094 Medchal Zone, TGSPDCL,

Mint Compound, Hyderabad – 500004.

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**NOTE:**

1. **“Payment terms, Bank Guarantee, Taxes & Duties” should be online with the Terms and Conditions of the specification. If any bidder does not meet any one of the Conditions, such tender will not be considered.**

**Hence the bidder shall submit the tender ONLINE with the Terms & Conditions of the specification.**

1. **The bidders shall check the** [www.tssouthernpower.com](http://www.tssouthernpower.com) / [www.eprocurement.gov.in](http://www.eprocurement.gov.in) **for amendments, alterations, corrections & additions if any, up to one day prior to the date of tender opening (Notified through CORRIGENDUM only and NO SEPARATE press notification will be issued). The amendments, alterations, corrections & additions shall be binding on the bidders.**

# SOUTHERN POWER DISTRIBUTION COMPANY OF T.G LIMITED HYD

**Specification No: CE/OP/Medchal Zone– 39 /2025-2026**

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| --- | --- | --- | --- |
| **1.** | **Name of the work** | : | Providing of 33KV alternate source of supply to 33/11KV Andole (new) SS from 132KV/33KV Jogipet EHT Sub-Station by erection of 33KV interlinking SCOH line with 100sq.mm AAA conductor for a distance of 10.2KM over now proposed 11Mtrs PSCC Poles in Andole Section of Jogipet Sub-Division of Jogipet Division in Sangareddy Circle under T&D Improvements to original works. |
| **2.** | **Scheduled Amount of tender (ECV)** | : | **Rs.27,47,269/- (Excluding 18% GST)** |
| **3.** | **Period of completion of work** | : | 1 Month |
| **4.** | **Issue of Tender Schedule** | : | The bidders need to register on the electronic procurement market place of Government of T.G. that is [www.tender.telangana.gov.in](http://www.tender.telangana.gov.in). On registration on the e-procurement market place they will be provided with a user ID and password by the system using which they can submit their bids on line. |
| **5.** | **Bid Downloading Start Date & Time** | : | **28.01.2026, from 14:00 hrs** |
| **6.** | **Bid Downloading End Date& Time** | : | **05.02.2026,14:00 hrs.** |
| **7.** | **Last Date & Time for Submission Hard copies** |  | **06.02.2026,14:00 hrs.** |
| **8.** | **Technical Bid Opening Date& Time** |  | **06.02.2026, 14:30 hrs.** |
| **9.** | **2% of Bid Security to be paid along with Tender** |  | **Rs. 54,945/- (Excluding 18% GST for DD/BG/Online)** |
| **10** | **Transaction Fee Payable** | : | As specified by the TGTS department |

All Bidders shall hand over the original DD/BG for Bid Security and hard copies of uploaded Documents to the Chief Engineer/Operation/Medchal Zone/TGSPDCL, Mint Compound, Hyderabad through authorized representative directly or through his agent or by registered post or by courier service so as to reach on or before 06.02.2026, 14:00 Hrs.

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| **Notice Inviting Bid Details** | | |
| **S.No.** | **Description** |  |
| 1 | Department Name | TGSPDCL |
| 2 | Office | Chief Engineer / Operation/ Medchal Zone / TGSPDCL. |
| 3 | Bid Number | **Tender Specification No: CE/OP/Medchal Zone- 39 /2025-26** |
| 4 | Name of the Work | Providing of 33KV alternate source of supply to 33/11KV Andole (new) SS from 132KV/33KV Jogipet EHT Sub-Station by erection of 33KV interlinking SCOH line with 100sq.mm AAA conductor for a distance of 10.2KM over now proposed 11Mtrs PSCC Poles in Andole Section of Jogipet Sub-Division of Jogipet Division in Sangareddy Circle under T&D Improvements to original works. |
| 5 | Work completion Schedule | **1 month** |
| 6 | Type of Bid | e-tender |
| 7 | Bid Category | Short tender |
| 8 | Bid Security (INR) | **Rs. 54,945/- (Excluding 18% GST for DD/BG/Online)** |
| 9 | ECV amount | **Rs.27,47,269/- (Excluding 18% GST) (Excluding 18% GST)** |
| 10 | Bid Security Payable to | In the form of Demand Draft/Bank Guarantee in favor of TGSPDCL payable at Hyderabad,from any Scheduled/Nationalized Banks. |
| 11 | **Transaction** Fee | **Transaction Fee**: All the participating Bidders who submit, have to pay an amount @ 0.03% of their final Bid value online a cap of Rs.10,000/- for quoted value of work up to Rs.50 Cores Rs. 25000/- if the purchase value is above Rs.50 crores& services applicable as levied by Govt. of India on transaction fee the online to the agency specified by TGTS department and the same amount is non refundable.  **Corpus Fund**: Successful Bidder has to pay an amount of0.04%on quoted value through demand draft in favour of Managing Director TGTS, Hyderabad towards corpus fund at the time of **conclusion** of agreement. |
| 12 | **Transaction** Fee Payable to | As specified by TGTS department |
| 13 | Bid submission starting date & time (for uploading) | **28.01.2026, from 14:00 hrs** |
| 14 | Bid Submission | On line |
| 15 | (i) Hard copies submission date & time  (ii) Technical Bid opening date &time | **06.02.2026, 14:00 hrs.**  **06.02.2026, 14:30 hrs.** |
| Price Bid opening date & time | **09.02.2026, 15:00 hrs.** |
| 16 | Place of Tender Opening | Chief Engineer/Operation/ Medchal Zone/TGSPDCL/Mint Compound, Hyd – 500004. |
| 17 | Officer Inviting Bids/Contact Person | Chief Engineer/Operation/ Medchal Zone/TGSPDCL/Mint Compound, Hyd – 500004. |
| 18 | Address | O/o the Chief Engineer/Operation/ Medchal Zone/TGSPDCL/Mint Compound, Hyd – 500004. |
| E-mail Id | [**cgm\_op\_medchal@tssouthernpower.com**](mailto:cgm_op_medchal@tssouthernpower.com) |
| 19 | Contact Details/Telephone, Fax | Office Tele. Ph .No:040 23431094. |
| 20 | Procedure for Bid Submission | 1.Bids shall be submitted online on [**www.tender.telangana.gov.in**](http://www.tender.telangana.gov.in) platform.  2.The participating Bidders in the Bid should register themselves free of cost on e-procurement platform in the website [**www.tender.telangana.gov.in**](http://www.tender.telangana.gov.in)  3.Bidders can log-in to e-procurement platform in secure mode only by signing with the Digital certificates.  4.The Bidders who are desirous of participating in e-tendering shall submit their technical Bids, price Bids as per the standard formats available at the e-procurement platform.  5. The Bidders are requested to upload the document as mentioned below mentioned in Sl.No:21 in online and submit the same as hard copies, so as to reach on or before **06.02.2026@14:00Hrs**, otherwise the bidder will be declared as Disqualified. |
| 21 | Important Note | The Bidder shall upload all the Mandatory Documents **duly attested by the Gazetted Officer in online. Further, the Mandatory documents namely Self Declaration, Litigation History, On hand works, critical equipment** are to be uploaded on Original letter heads with **self-attestation** and need not to be attested by the Gazetted Officer**.** The Bidders should submit EMD in the form of DD/BG (original) hard copy or if online payment is done the copy of the same shall be submitted as hard copy and for exemption of EMD the SC/ ST Contractors shall submit hard copy of SC/ ST Certificate issued by the Mandal Tahasildar as hard copy on or before [06.02.2026@14:00Hrs](mailto:06.02.2026@14:00Hrs), otherwise the bidder will be declared as Disqualified. |
| 22 |  | 1. The Department shall not hold any risk on account of postal delay; similarly, if any of the certificates, documents, etc., furnished by the Bidder are found to be misleading/false/fabricated/bogus, the Bidder will be disqualified and blacklisted duly forfeiting the Bid security.  2. The department will not hold any risk and responsible regarding non-visibility  of the scanned and uploaded documents.   1. Important Notice to Contractors, Suppliers Department users   In the endeavor to bring total automation of processes e-Procurement, the Govt. has issued orders vide G.O.Ms.No.13 dated.5-07-2006 permitting integration of electronic Payment Gateway of ICICI/HDFC Banks with e-Procurement platform, which provides a facility to participating suppliers/contractors to electronically pay the transaction fee online using their credit cards. |
| 23 | Rights reserved with the Department | TGSPDCL reserves the right to accept or reject any or all the Bids received without assigning any reasons there for. |
| 24 | General Terms and Conditions | As per Bid document. |

**Eligibility Criteria: Mandatory Conditions**

The Bidder shall upload all the mandatory Documents **duly attested by the Gazetted Officer in online** and should submit the EMD in the form of DD/BG (original) hard copy or if online payment is done the copy of the same shall be submitted as hard copy and for exemption of EMD the SC/ ST Contractors shall submit hard copy of SC/ ST Certificate issued by the Mandal Tahasildar, on or before last date of bid submission, otherwise the bidder will be declared as Disqualified. Further the mandatory documents namely **Self declaration, Litigation History, ON Hand works and Critical Equipment** are to be uploaded on Original letter heads with **self-attestation** and need not to be attested by the Gazetted Officer.

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| **S.No** | **Description** |
| **1** | **Financial Turn over**: The bidder should have achieved a minimum turnover of 50% **(i.e., Rs.13,73,634/-)** of Bid value during any one financial year in the preceding Seven financial years certified by Chartered Accountant. |
| **2** | Bid security: Valid Bid security @ 2% of ECV i.e., Rs. 54,945/- in the form of Online/Demand Draft/BG, DD in favor of TGSPDCL payable at Hyderabad & the Bidders may furnish a B.G in original in favour of Chief Engineer/Operation/Medchal zone/TGSPDCL duly mentioning the Specification No. of the bid & Name of the work from any Scheduled or Nationalized Banks & the validity should not be less than 135 days from the date of bid opening(As per CGM/Fin Memo.No: 45/23, Dt.16-06-2023).  Note: Exemption of EMD for SC/ST Category Reserved tenders, as per T.O.O. (CE/Civil) Ms. No. 511, Dt. 03-01-2020 & SP.O.O. (Projects) Ms.No.521, Dt.24-06-2020  i. Exemption of EMD shall be for the works costing up to 1.00 crore (ECV).  ii. However, in order to provide level playing field to all, EMD will be recovered from running bills after expenditure of 25% of the concerned works. This will also inculcate the responsibility for completion of the works. The Bonafideness of SC/ ST Contractors shall be considered based on the SC/ ST Certificate issued by the Mandal Tahasildar. |
| **3** | Liquid Assets/ Solvency Certificate not less than 20 % of Bid value (i.e., Rs. 5,49,454/-) and should have been issued by any scheduled bank or Nationalized bank not earlier than 12 Months prior to the date of bid opening. The TGSPDCL reserves the right where ever necessary to make queries with the bidders bankers. |
| **4** | **Electrical Experience:**  To qualify for award of the contract, each Bidder in his name should submit certificate issued by an Engineer not below the cadre of Divisional Engineer for the works executed in a consecutive period of **24 months during the Preceding 7 financial years**. The date of work commencement, completion along with Agreement No. should be invariably furnished in the performance certificates issued by the concerned Engineer.   1. **25%** of **10.2KM** length of Stringing of 33KV SCOH (or) DCOH line – **i.e.,2.6 KM.**   **Note:**  (i) 25% of the routelength must be executed in any consecutive 24 months period during preceding seven financial years.  (ii) TOWERS: If OH line is having 20 or less than 20 Towers, OH line experience will be considered. If OH line is having more than 20 Towers, 25% of No. of Towers experience is required. (iii) If needed, 33 kV UG/OH experience may be considered against 11 kV UG/OH experience for the required route length of 11 kV UG/OH route length (iv) If needed, M-Type tower experience may be considered against K-Type tower for the required quantity of K-Type tower. |
| **5** | The Bidder has to submit the Goods and Services Tax (GST) Registration certificate. |
| **6** | The contractor shall have **valid A Grade Electrical Contractors license** from CEIG, Government of Telangana upto 33KV or above voltage grade. |
| **7** | Self declaration by the bidder in token of having gone through carefully and thoroughly all the terms and conditions mentioned in the Bid document and abide by all the terms and conditions clearly mentioning the name of work or specification no of the bid. |
| **8** | The Bidder should upload the copies of EPF/ESI registration certificates. |
| **9** | The Bidder should upload the information of **Litigation History on letter head**. |
| **10** | **Critical Equipment:** For executing Sub Station and line works, the bidder shall submit a declaration certificate for the availability of CRITICAL EQUIPMENT either owned or leased such as ROLLERS, tractors, JCBs, Cranes, ropes, safety equipment with first aid kit, meggar, Tong tester, CHAIN PULLEY BLOCKS, welding machines, Drilling machines, gas cutters, concrete millers, Pin Vibrators, slab vibrators, RCC centering Equipment, Transport vehicles etc, as the case may be **(**Note: Bidders without giving declaration for Cable Rollers & Pullying machines will be summarily rejected as the cable work must be carried out using rollers only). |
| **11** | Bidders should upload the declaration of Qualification of key person/Site in charge with B.Tech/Diploma in Electrical Engineering from Recognized Universities. |
| **12** | Copy of **TGSPDCL Registration of the Vendor** |

**Optional Documents**

|  |  |
| --- | --- |
| **13** | Firm Registration/ Registered Partnership deed in case of firm :Firm Registration/Registered Partnership deed in case of firm |
| **14** | Email address of the bidder :Bidder must furnish the email address for correspondence |
| **15** | PAN Card |
| **16** | Submission of Hard copies :The Bidder should submit the hard copy of all uploaded mandatory documents for verification. |
| **17** | **Supporting documents for Financial turnover :**  (i) The Bidder shall submit a copy of financial turnover in the preceding Seven financial years certified by Chartered Accountant.  (ii) The bidder shall submit the last seven financial years Profit & Loss statements, Balance sheets and Income tax return statements supporting the Financial Turnover certified by Chartered Accountant. |

**Note:** Contractors are requested to upload above relevant documents as per order mentioned in the above Eligibility Criteria.

**SECTION-I INVITATION FOR BIDS (IFB)**

### A. GENERAL

1. **SCOPE OF BID**

1.1 The TGSPDCL (referred to as Employer in these documents) invites bids for the works (as defined in these documents and referred to as “the works”) detailed in the table given in IFB. The bidders should submit bids for the works detailed in the table given in IFB.

1.2 The successful bidder shall be expected to complete the works by the intended completion date specified in the contract data.

1. **ELIGIBLE BIDDERS**
   * 1. This Invitation for Bids is open to all bidders. Any materials, equipment, and services to be used in the performance of the Contract shall have their origin in India.
     2. All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a Statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Borrower to provide consulting services for the preparation or supervision of the works, and any of its affiliates shall not be eligible to bid.
     3. Government-owned enterprises in the Employer’s country may only participate if they are legally and financially autonomous, operate under commercial law and are not a dependent agency of the Employer.
     4. Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices in accordance with sub-clause 31.2.
2. **QUALIFICATION OF THE BIDDER**
   1. All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
   2. All bidders shall include the following information and documents with their bids in Section 2 compulsory. Otherwise the bids will be evaluated based on the information available in the Bid.
   3. Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, written power of attorney of the signatory of the Bid to commit the Bidder;
   4. Total monetary value of construction work performed for each year of the last seven financial years.
   5. Experience in works of a similar nature and size for each of the last seven years, and details of works under way or contractually committed; and clients who may be contacted for further information on those contract;
   6. Major items of construction equipment proposed to carry out the Contract;
   7. Qualifications and experience of key site managements and technical personnel proposed for the Contract.
   8. Reports on the financial standing of the Bidder, such as profit and loss statements and auditor’s reports for the past seven financial years.
   9. Evidence of adequacy if working capital for this contract (access to line (s) of credit and availability of other financial resources).
   10. Authority to seek references from the Bidder’s bankers:
   11. Information regarding any litigation, current or during the last seven years, in which the Bidder is involved, the parties concerned, and disputed amount.
   12. The proposed methodology of construction, backed with their construction equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of achieving the completion of work as per milestones specified within the stipulated period of completion.
   13. Financial turnover should be certified by Chartered Accountant.

3.3  **a) Bids from joint ventures are not acceptable.**

b) The sub agencies can be appointed for execution by the principle contractor under due approval of the Employer basing on the competence and capacity of such proposed sub agency.

3.4 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified and black listed if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or

* Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completions, litigation history, or financial failures etc.

- The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder may result in rejection of Bid.

3.5 All the materials to be utilized for the project should be subjected for inspection before dispatch. The cost of the inspection shall be borne by the bidder. The contractor shall intimate the Employer, the bar chart for procurement of various items and execution, enabling the concerned officer to arrange for inspection of such materials. The original invoices of purchases must be enclosed along with the bill for payment.

3.6 The bidders have to furnish an undertaking in the prescribed format given in Section-2 disclosing their relationship with the officers/Chief General Managers of TRANSCO / DISCOM. Any false information furnished in the declaration will render the contract liable for termination as well as recovery of damages.

As per the Clause 2.2 of General Contract Conditions of PWD bid document the following firms are ineligible to participate in tender: (i) A retired officer of the government unified AP/Telangana of Govt. of India executing works is disqualified from tendering for a period of (2) years from the date of retirement without the prior permission of government.

(ii) The tenderer who has employed any retired officers as mentioned above shall be

considered as an in eligible tenderer.

(iii) The contractor himself or any of his employees is found to be Gazetted Officer who retired from government Service and had not obtained permission from the Government for accepting the contractors employment within a period of 2 years from the date of his retirement.

(iv) The contractor or any of his employees is found at any time after award of contract to be such a person who had not obtained the permission of the Government as aforesaid before submission of the tender or engagement in the contractor's service.

(v)Contractor shall not be eligible to tender for works I the division/circle where any of his near relatives are employed in the rank of Assistant Engineer or Assistant Executive Engineer and above on the Engineering side and Divisional Accounts Officers and above on the Administrative side. The contractor shall intimate the names of persons who are working with him in any capacity or are subsequently employed. He shall also furnish a list of Gazetted Non-Gazetted, State Government Employees related to him.

Failure to furnish such information tenderer is liable to the removed from the list of approved contractors and his contract is liable for cancellation.

Note: Near relatives include

1) Sons, Step sons, daughter, and step daughter.

2) Son-in-law and daughter-in-law.

3) Brother-in-law and sister-in-law.

4) Brothers and sisters.

5) Father and mother.

6) Wife / husband.

7) Father-in-law and Mother-in-law

8) Nephews, nieces, unele and munts.

9) Cousins and

10) Any person residing with or dependent on the contractor.

This is issued with the concurrence of the Chairman & Managing Director/TGSPDCL

3.7 Notwithstanding anything stated above the owner reserves the right to assess the capability and capacity of the bidder to successfully execute the work covered under the package within stipulated completion period. This assessment shall inter-alia include (i) document verification (ii) bidder’s work/ manufacturing facilities visit (iii) manufacturing capacity, details of work executed, works in hand, anticipated in future in addition to the works involved in present bid (iv) details of plant and machinery, manufacturing and testing facilities, manpower and financial resources (v) details of quality systems in place (vi) past experience and performance (vii) customer feedback (viii) banker’s feedback etc.

1. **COST OF BIDDING**

The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

1. **SITE VISIT**
   1. The Bidder, at the Bidder’s own responsibility and risk is encouraged to visit, examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder’s own expense.

#### B. BIDDING DOCUMENTS

1. **CONTENT OF BIDDING DOCUMENTS**
   1. The set of bidding documents comprises the documents listed in the table below and addendum issued in accordance with Clause 8:

Section Invitation for Bids

Instruction to Bidders

Forms of Bid and Qualification Information

Conditions of Contract

Contract Data

Technical Specifications

Bill of Quantities

Forms of securities

1. **CLARIFICATION OF BIDDING DOCUMENTS**

A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or by cable e-mail or FAX at the Employer’s address indicated in the invitation to bid. The Employer will respond for clarification, which he received earlier than 15 days prior to the deadline for submission of bids. Copies of the Employer’s response will be forwarded to all purchases of the bidding documents, including a description of the enquiry but without identifying its source.

1. **AMENDEMENT OF BIDDING DOCUMENTS**

8.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing amendment. The same will be communicated through e-procurement platform and also in TGSPDCL website.

8.2 Any amendment thus issued shall be part of the biding documents and shall be communicated through e-procurement platform and also in TGSPDCL website.

8.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 18.2 below, and the same will be communicated through e-procurement platform and also in TGSPDCL website.

##### C. PREPARATION OF BIDS

**9. LANGUAGE OF THE BID**

All documents relating to the bid shall be in the English language

**10. DOCUMENTS COMPRISING THE BID**

The bid submitted by bidder shall comprise the following:

1. Bid Security as per clause 14 of ITB (Original)
2. Technical Bid information

And any other materials required be completing and submitting by bidders in accordance with these instructions. The documents listed under Sections 2.4 and 7 of Sub-Clause 6.1 shall be filled in without exception.

**11. BID PRICES**

* 1. The contract shall be for whole works as described in Sub-Clause 1.1.

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* 1. The Bidder has to quote his rate which shall be inclusive of all costs of inspection & testing of equipment/ material by the nominated representative of the employer for each batch of equipment/ material manufacture on e-procurement site.

11.3 All duties, taxes (exclusive of GST), and other levies payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

11.4 The rates and prices quoted by the bidder shall be fixed

**12. CURRENCIES OF BID AND PAYMENT**

The bidder entirely in Indian Rupees shall quote the unit rates and the prices.

**13. BID VALIDITY**

* 1. Bids shall remain valid for a period not less than 90 days after the deadline date of bid submission specified in Clause 18. A Bid valid for a shorter period shall be rejected by the employer as non-responsive.

13.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidder’s responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 14 in all respects.

**14. BID SECURITY**

* 1. The Bidder shall furnish, as part of his Bid, a Bid security compulsorily as shown in column 9 of the table of IFB for this particular work. This bid security shall be in the form of Online/BG/DD drawn in favour of **TGSPDCL payable at Hyderabad** from any scheduled or nationalized bank.
  2. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 14.1 can be rejected by the employer as non-responsive.
  3. The Bid Security of the unsuccessful bidder will be returned after fixing up of agency.
  4. The Bid Security of the Successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
  5. The Bid Security may be forfeited

1. If the Bidder withdraws the Bid after Bid opening during the period of Bid validity:
2. If the Bidder does not accept the correction of the Bid Price, pursuant to Clause 25 or
3. In the case of successful Bidder, if the Bidder fails within the specified time limit to
   1. Sign the Agreement or
   2. Furnish the required Performance Security.
4. **ALTERNATIVE PROPOSALS BY BIDDERS**
   1. Bidder shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.
   2. **However any variation or deviation from the works proposed in the bids specification (Provision of works in the scheme) if found necessary as per the field conditions shall be got approved by the Superintending Engineer / concerned.**

**In turn Superintending Engineer /Concerned for any variation or deviation from the works proposed in the bids specification (i.e. Provision of works in the scheme) shall take approval of the Corporate Office before approving the same and getting it executed by the contractor.**

1. **FORMAT AND SIGNING OF BID**

16.1 If the tender is made by an individual, it shall be signed with his full name and his address shall be given. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm, who shall also sign his own name, and the name and address of each member of the firm shall be given, if the tender is made by a corporation it shall be signed by a duly authorized officer who shall produce with his tender satisfactory evidence of his authorization. Such tendering corporation may be required before the contract is executed, to furnish evidence of its corporate existence. Tenders signed on behalf of G.P.A holder will be rejected.

* 1. The tender shall contain no alterations or additions, except those to comply with instructions issued by the tender inviting officer, or as necessary to correct errors made by the tenderer, in which case all such corrections shall be initialized by the person signing the tender.
  2. The Bid shall contain no alterations or additions, except those to comply with instructions, issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.
  3. The Bidder shall furnish information as described in the form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to the Bid, and to contract execution if the Bidder is awarded the contract.

###### D. SUBMISSION OF BIDS

**17. SEALING AND MARKING OF BIDS**

17.1 The Bidder shall submit bids on e-procurement platform only and **Hard copies** of uploaded documents only along with **2% bid security original DD duly** sealed as part of technical bid subject to fulfillment of other required obligations of the bid document. The Bid evaluation of the tenderers will be done based on the certificates /documents uploaded through online only towards qualification criteria furnished by them.

* 1. The tenderer has to submit the attested hard copies of all the uploaded documents with in the stipulated time.
  2. The tenderer shall invariably furnish the hard copy original DD towards EMD and other attested hard copies of the uploaded documents to the tender inviting authority within 1 **day after opening of the tender**either personally or through courier or by post and the receipt of the same within the stipulated time shall be the responsibility of the bidder. Department will not take any responsibility for any delay or non receipt.
  3. The participating bidders shall electronically pay the transaction fee (i.e., 0.03% of E.C.V plus 18% GST) in favour of **M/s C1 India Pvt. Ltd**. through payment gateway of ICICI Bank, HDFC bank and UTI bank for providing online payment service through e-procurement.

The payment of transaction fee by the participating Bidders through the electronic payment Gateway to the service provider is made mandatory as per GO Ms No 13 information technology & communication department, e-procurement dated 05-07-2006 & GO Ms No 11 IT & C department dated 5-5-2007.

* 1. The successful (L1) tenderer shall furnish the original hard copies of all the documents / certificates / statements uploaded by them before concluding the Agreement.

1. **DEADLINE FOR SUBMISSION OF THE BIDS**
   1. Bids must be submitted not later than the date and time specified in NIT. In the event of the specified date / time for the submission of bids declared as holiday, the bids will be received on the next working day.
   2. The employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 8, in which case all rights and obligations of the Employer and the bidder previously subject to the original deadline will then be subject to the new deadline.

**19. LATE BIDS**

Hard copies received after the last date / time prescribed in NIT will be summarily rejected.

1. **MODIFICATION AND WITHDRAWAL OF BIDS**
   1. No tender shall be modified after the last date / time of submission of tenders.
   2. No bid may be modified after the deadline for submission of Bids.

E. BID OPENING AND EVALUATION

1. **BID OPENING**
   1. The tenderers or their authorized representatives can be present at the time of opening of the tenders. Either the tenderer himself or one of his representative with proper authorization only will be allowed at the time of tender opening. If any of the tenderer is not present at the time of opening of tenders, the tender opening authority will, on opening the tender of the absentee tenderer, reads out and record the deficiencies if any, which shall be binding on the tenderer.
   2. The technical bid containing qualification requirements as per requirement will be evaluated by the tender opening authority and the minutes are recorded which will be signed by the tender opening authority as well as tenderers or their authorized representatives present.

1. **PROCESS TO BE CONFIDENTIAL**
   1. Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer’s processing of Bids or award decisions may result in the rejection of his Bid.

23 **CLARIFICTION OF BIDS**

* 1. To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates. The request for clarification and the responses shall be in writing or by cable, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 25.
  2. Subject to Sub-Clause 23.1, no Bidder shall contact the Employer on any matter relating to its bid from the time of the bidding opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, he should do so in writing.
  3. Any effort by the Bidder to influence the Employer in the Employer’s bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidder’s bid.

1. **EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS**
   1. Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 2; (b) has been properly signed; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding documents.
   2. A substantially responsive Bid is one, which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer’s rights or the Bidder’s obligations under the Contract, or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.
   3. If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-confirming deviation or reservation.

1. **EVALUATION AND COMPARISON OF BIDS**
   1. The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause 24.
   2. Selection of tenderer among the lowest and equally quoted tenderers will be in the following orders:
2. The tenderer whose bid capacity is higher will be selected.
3. In case the bid capacity is also same the tenderer whose annual turnover is more will be preferred.
4. Even if the criteria incidentally become the same, the turnover on similar works and thereafter machinery available for the work and then the clean track record will be considered for selection.
5. **DISCRIPENCY IN PERCENTAGE QUOTED**
   1. In case of any discrepancy between the overall tender percentage quoted in words and figures, the percentage quoted in words shall prevail. In case the tenderer has quoted overall tender percentage only in words and not in figures or vice versa, such tender shall be treated as incomplete and rejected.
   2. The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variation, deviations, and alternative offers and other factors which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Bid evaluation.
   3. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer’s estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 30 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

F. AWARD OF CONTRACT

* + 1. **27. AWARD CRITERIA**
  1. Subject to Clause 28, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause2, and (b) qualified in accordance with the provisions of Clause 3.

**28 EMPLOYER’S RIGHT TO ACCEPT ANY BID TO REJECT ANY OR ALL BIDS**

28.1 Not withstanding Clause 27, the Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer’s action.

**29. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT**

29.1 The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter in the Conditions of Contract called the “Letter of Acceptance”) will state the sum that the Employer will

pay the Contractor in consideration of the execution, completion, and maintenance of the works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the “Contract Price”).

29.2 The notification of award will constitute the formation of the Contract, subject only to the

Furnishing of a performance security in accordance with the provisions of Clause 30.

29.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the employer and sent to the successful Bidder, within 28 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement

and deliver it to the Employer.

29.4 Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

* + 1. **30.PERFORMANCE SECURITY**

30.1 Within 21 days of receipt of the Letter of Acceptance, the Successful Bidder shall deliver to the employer a Performance Security in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced Bids in accordance with Clause 30.4

* + - * + a bank guarantee in the form given in Section 8 ; or
        + Bank draft, in favour of TGSPDCL, payable at Hyderabad from any scheduled or nationalized bank.

30.2 If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder’s option, by Nationalized/Scheduled Indian Bank or (b) by a foreign Bank located in India and accepted to the Employer.

30.3 Failure of the successful Bidder to comply with the requirements of Sub-Clause 30.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

* 1. In Event of tender amount are quoted less by more than 10% of the Estimate the bidder has to accept the tender by obtaining bank guarantee for the difference between the tendered amount and 90% of the estimate value.

**31. CORRUPT OR FRAUDULENT PRACTICES.**

31.1 Employer expects that Bidders/Suppliers/Contractors observe the highest standard of ethics during the procurement and execution of such contracts.

In pursuance of this policy, the Employer.

1. Defines, for the purposes of this provision, the terms set forth below as follows:
2. “Corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution, and
3. “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the determent of the Employer, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.
4. Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.
5. Will declare a firm ineligible, either indefinitely or for a stated period of time, if Employer any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing TGSPDCL contract.

31.2 Furthermore, Bidders shall be aware of the provision stated in sub-clause 22.2 and sub clause 52.2 of the General Conditions of Contract.

SECTION 2

FORMS OF BID, QUALIFICATION INFORMATION AND LETTER OF ACCEPTANCE

TABLE OF FORMS:

* CONTRACTOR’S BID
* QUALIFICATIONS INFORMATION
* LETTER OF ACCEPTANCE
* NOTICE TO PROCEED WITH THE WORK
* PERFORMANCE SECURITY
* AGREEMENT FORM

CONTRACTOR’S BID

Description of the Works:-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**To**

The Chief Engineer, Operation

Medchal Zone, TGSPDCL,

Mint Compound, Hyderabad –500004.

Gentlemen,

We offer to execute the works described above in accordance with the Conditions of contract accompanying this Bid for the Contract Price of ------------------------(in figures) (-----------------------------------------------------------------------------) in letters.

The Bid and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

Commission or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and address of agent Amount Purpose of Commission or gratuity

…………………………… ………… ………………………………………

……………………………. …………. ……………….………………………

……………………………. ………… ………………………………………

(if none, state “none”)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

We hereby confirm that this Bid complies with the Bid Validity and Bid Security required by the Bidding documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Bidder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Address:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. To be filled by Bidder, together with his particulars and date of submission at the bottom of the form of Bid.

QUALIFICATION INFORMATION

The information to be filled in by the Bidder in the following pages will be used for purposes of post-qualification as provided for in Clause 3 of the Instructions to Bidders. This information will not be incorporated in the Contract.

* + 1. For Individual Bidders
  1. Constitution of legal status of Bidder (Attach Copy)

Place of Registration: (Attach copy)

Principal place of business:

Power of Attorney of Signatory of Bid (Attach copy)

* 1. Total value of Electrical Engineering Construction

Work performed in the last Seven years

(in Rs. Lakhs)

2018-2019 -------------

2019-2020 ------------

2020-2021 -------------

2021-2022 ------------

2022-2023 ------------

2023-2024------------

2024-2025------------

* + 1. Work performed as prime contractor (in the same name) on works of a similar nature over the last Seven years.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project Name** | **Name of Employer** | **Description of work** | **Contract No.** | **Value of contract**  **(Rs. Lakhs)** | **Date of issue of work order** | **Stipulated period of completion** | **Actual date of completion** | **Remarks Explaining reasons for delay in work completion** |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

* + 1. Quantities of work executed as prime contractor (in the same name and style) in the preceding Seven financial years: 2018-19,2019-20, 2020-21, 2021-22,2022-23,2023-24,2024-25.

.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Name of the work | Qty | Amount (Rs. lakhs) | Remarks \* (Indicate contract ref.) |
|  |  |  |  |  |

Enclosed certificate(s) from the Engineer(s) in-Charge.

@ The item of work for which data is requested should tally with that specified in ITB clause 3.4(A) & 3.4(C )

\* Immediately preceding the financial year in which bids are received

1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going works:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Description of work | Place & State | Contract No. & Date | Name and Address of Employer | Value of Contract (Rs.Lakhs) | Stipulated period of completion (Rs. Lakhs) | Value of works \* remaining to be completed | Anticipated date of completion |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |

1. Works for which bids already submitted:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Description of work | Place & State | Estimated value of works (Rs. Lakhs) | Stipulated period of completion | Date when decision is completed | Remarks if any expected |
| (1) | (2) | (3) | (4) | (5) | (6) |

\*Enclosed certificate (s) from the Engineer(s)-in-Charge.

* 1. The following items of Contractors Equipment are essential for carrying out the Works. The Bidder should list all the information requested below. Refer also to Sub Clause 3.2 (d) of the Instructions to Bidders.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Item of Requirement Availability proposals Remarks

Equipment No. Capacity Owned/leased Nos./ Age/ (from whom to be procured capacity condition to be purchased)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Qualifications and experience of key personnel proposed for administration and execution of the contract. Attach biographical data. Refer also to Sub Clause 3.2 (e) of instructions to Bidder and Sub Clause 8.1 of the Conditions of Contract.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Position Name Qualifications Years of Years of experience in

Experience the proposed position

(general) Project Manager

Etc.

* 1. Financial reports for the last Seven years: balance sheets, profit and loss statements, auditors report (in case of companies / corporation) etc. List them below and attach copies.
  2. Evidence of access to Financial resources to meet the qualification requirements: cash in hand, lines of credit, etc., List them below and attach copies of support documents.
  3. Name, address and telephone, telex, and fax numbers of the Bidders’ bankers who may provide references if contacted by the Employer.
  4. Performance certificate for the works executed is to be furnished
  5. Information on litigation history in which the Bidder is involved.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Other party(ies) Employer Cause of dispute Amount Remarks showing

Involved present status \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Statement of compliance under the requirements of Sub Clause 3.2 of the instructions to Bidders.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* 1. Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. (Refer ITB Clause 3.1 and 3.2 (k))

1. Additional Requirements

2.1 Bidders should provide any additional information required to fulfill the requirements of Clause 3 of the Instructions to the Bidders, if applicable.

LETTER OF ACCEPTANCE

(Letterhead paper of the Employer)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(date)

To

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name and address of the Contractor)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dear Sirs,

This is to notify you that your Bid dated \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for execution of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[name of the contract and identification number, as given in Instruction to Bidder]1 for the Contract Price of Rupees \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(\_\_\_\_\_\_\_\_\_\_\_\_\_) [Amount in words and figures], as corrected and modified in accordance with the instructions to Bidders’ is hereby accepted by our Agency.

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 26.4 in the form detailed in Para 30.1 of ITB for an amount of Rs.\_\_\_\_\_\_\_\_ within 21 days of the receipt of this letter of acceptance valid upto 28 days from the date of expiry of Defects Liability Period i.e. upto. ………and sign the contract, failing which action as stated in Para 30.3 of ITB will be taken.

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

1. Delete “correct and” or “and modified” if only one of these actions applies. Delete “as corrected and modified in accordance with the Instructions to Bidders” if corrections or modifications have not been effected.
2. To be used only if the Contractor disagrees in his Bid with the Technical Expert proposed by the Employer in the “Instructions to Bidders”.

ISSUE OF NOTICE TO PROCEED WITH THE WORK

(Letterhead of the Employer)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(date)

To

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name and address of the Contractor)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 30.1 and signing of the contract for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ @ Bid Price of Rs. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of Signatory

authorized to sign on behalf of Employer)

AGREEMENT FORM

Agreement

The agreement, made the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ day of \_\_\_\_\_\_\_\_\_\_\_\_\_2026\_\_\_\_\_\_\_\_\_\_ between\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[name and address of Employer]

(hereinafter called “the employer)” and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[name and address of contractor] (hereinafter called “the Contractor” of the other part).

Whereas the Employer is desirous that the Contractor execute \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)name and identification number of Contract] (hereinafter called “The Works”) and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a cost of Rs…………………………………………………………………….

NOW THIS AGREEMENT WITNESSTH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the contractor in consideration of the execution and completion of the Works and remedying the defects where in the Contract Price or such other sum as may become payable under provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
   1. Letter of Acceptance;
   2. Notice to proceed with the works;
   3. Contractor’s Bid;
   4. Contract Data;
   5. Conditions of Contract;
   6. Specifications;
   7. Drawings;
   8. Bill of Quantities; and
   9. Any other document listed in the Contract Data as forming part of the Contract.

In witness whereof the parties there to have caused this Agreement to be executed the day and year first before written.

The Common Seal of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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in the presence of:

Binding Signature of Employer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Binding Signature of Employer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SECTION 3

GENERAL CONDITIONS OF CONTRACT

**CONDITIONS OF CONTRACT**

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CONDITIONS OF CONTRACT

A.GENERAL

1. **DEFINITIONS**
   1. Terms which are defined in the Contract Data are also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.  
Compensation Events are those defined in Clause 41 hereunder.

The Completion Date is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 48.2

The Contract is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The Contract Data defines the documents and other information which comprise the bid accepted by the Employer

The Contractor’s Bid is the completed Bidding document submitted by the Contractor to the Employer

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

The Defects Liability Period is the period named in the Contract Data and calculated from the Completion Date.

The Employer is the party who will employ the Contractor to carry out the works.

The Engineer is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contract, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, awarding extensions of time, and valuing the Compensation Events.

Equipment is the Contractor’s machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price listed in the Employer’s Letter of Acceptance.

The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The Site is the area defined as such in the Contract Data.

Site Investigation Reports are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The Start Date is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A Variation is an instruction given by the Engineer which varies the Works.

The Works are what the Contract requires the Contractor to Construct, install, and turn over to the Employer, as defined in the Contract Data.

1. **INTERPRETATION**
   1. In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about the Conditions of Contract.
   2. If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works the Completion Date, and the Intended Completion Date apply to any Section of the works (other than references to the Completion Date and Intended Completion date for the whole of the Works).
   3. The documents forming the Contract shall be interpreted in the following order of priority:
2. Agreement
3. Letter of Acceptance, notice to proceed with the works.
4. Contractor’s Bid
5. Contract Data
6. Conditions of Contract
7. Specifications
8. Drawings
9. Bill of quantities and
10. Any other document listed in the Contract Data as forming part of the Contract.
11. Amendments/ Pre Bid decision if any
12. **LANGUAGE AND LAW**

The language of the Contract and the law governing the Contract are stated in the Contract Data.

1. **ENGINEERS DECISIONS**

Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

1. **DELEGATION**

The Engineer may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

1. **COMMUNICATIONS:** Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act.)
2. **OTHER CONTRACTORS**

The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors. The Contractor shall as referred in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modification.

1. **PERSONNEL**
   1. The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule of other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.
   2. If the Engineer asks the Contractor to remove a person who is a member of the Contractor’s staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.
2. **EMPLOYER’S AND CONTRACTOR’S RISKS**

The Employer carries the risks which the Contract states are Employer’s risks, and Contractor carries the risks which this Contract states are Contractor’s risks.

1. **EMPLOYER’S RISKS**

The Employer is responsible for the excepted risks which are(a) in so far as they directly affect the execution of the Works in the Employer’s country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor’s employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive or (b) a cause due solely to the design of the Works, other than the Contractor’s design.

1. **CONTRACTOR’S RISKS**

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

1. **INSURANCE**
   1. The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the start Date to the end of the Defects Liability Period, in the amounts and deductibles stated into the Contract Data for the following events which are due to the Contractor’s risks:
   2. loss of or damage to the Works, Plant and Materials;
   3. loss of or damage to Equipment
   4. loss of or damage of property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
   5. personal injury or death.
   6. Policies and certificates for insurances shall be delivered by the Contractor to the Engineer for the Engineer’s approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred
   7. If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.
   8. Alterations to the terms of insurance shall not be made without the approval of the Engineer.
   9. Both parties shall comply with any conditions of the insurance policies.
2. **SITE INVESTIGATION REPORTS**

The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

1. **QUERIES ABOUT THE CONTRACT DATA**

The Engineer will clarify queries on the Contract Data.

1. **CONTRACTOR TO CONSTRUCT THE WORKS**

The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

1. **THE WORKS TO BE COMPLETED BY THE INTENDED COMPLETION DATE**

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor as updated with the approval of the Engineer, and complete them by the intended completion Date.

1. **APPROVAL BY THE ENGINEER**
   1. The Contractor shall submit Specifications and Drawings showing the proposed

Temporary Works to the Engineer, who is to approve them if they comply with the

Specifications and Drawings.

* 1. The Contractor shall be responsible for design of Temporary Works.
  2. The Engineer’s approval shall not alter the Contractor’s responsibility for design of

the Temporary Works.

* 1. The Contractor shall obtain approval of third parties to the design of the Temporary

Works where required.

* 1. All Drawings prepared by the Contractor for the execution of the temporary or

permanent Works, are subject to prior approval by the Engineer before their use.

1. **SAFETY**

The Contractor shall be responsible for the safety of all activities on the Site.

1. **DISCOVERIES**

Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Engineer of such discoveries and carry out the Engineer’s instructions for dealing with them.

1. **POSSESSION OF THE SITE**

The Employer shall give possession of all parts of the Site to the Contractor by

the date stated in the contract data, for execution of works.

1. **ACCESS TO THE SITE**

The Contract shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured/fabricated/assembled for the works.

1. **INSTRUCTIONS**
   1. The Contractor shall carryout all instructions of the Engineer which comply with the applicable laws where the Site is located.
   2. The Contractor shall permit employer or his representative to inspect the Contractor’s accounts and records relating to the performance of the Contractor.
2. **DISPUTES**

If the Contractor believes that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to the Arbitrator within 14 days of the notification of the Engineer’s decision.

# B .TIME CONTROL

**25. PROGRAME**

* 1. Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.
  2. An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.
  3. The Contractor shall submit to the Engineer, for approval, an updated Program at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within the period, the Engineer may with hold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
  4. The Engineer’s approval of the Program shall not alter the Contractor’s obligations. The Contractor may revise the Program and submit it to the Engineer again at any time. A revised Program is to show the effect of variations and Compensations Events.

**26. EXTENSION OF THE INTENDED COMPLETION DATE**

* 1. The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or various is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
  2. The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new intended completion Date.

**27. DELAYS ORDERED BY THE ENGINEER**

The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

**28. MANAGEMENT MEETINGS**

* 1. Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
  2. The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

**29. EARLY WARNING**

* 1. The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events of circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.
  2. The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.
     1. **QUALITY CONTROL**

**30. IDENTIFYING DEFECTS**

The Engineer shall check the Contractor’s work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor’s responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

# 30.1 QUALITY ASSURANCE

# 30.1.1 QUALITY ASSURANCE PROGRAMME

To ensure that the equipment are in accordance with the specifications, the contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programme shall be out lined by the contractor and shall be finally accepted by owner / authorized representative after discussions before the award of contract. The QA programme shall be generally in line with ISO-9000/IS-14000. A quality assurance programme of the contractor shall generally cover the following:

1. His organization structure for the management and implementation of the proposed quality assurance programme.
2. Quality system manual
3. Design control system
4. Documentation control system
5. Qualification data for bidder’s key personnel.
6. The procedure for purchase of material, parts, components and selection of sub vendors service including vendor analysis, source inspection, incoming raw material inspection, verification of materials purchased etc.
7. System for shop manufacturing control including process controls, fabrication and assembly controls.
8. Control of non conforming items and systems for corrective actions
9. Inspection and test procedure
10. Control of calibration and testing of measuring and testing equipment
11. System for indication and appraisal of inspection status
12. System for quality audit
13. System for authorizing release of manufactured product to owner
14. System for maintenance of records
15. System for handling storage and delivery
16. All the plant standard / written down practices followed by the manufacturing / contractor against the manufacturing activities in their works will be submitted in electronic media preferably in at least one set of compact discs.

## 30.1.2 GENERAL REQUIREMENTS – QUALITY ASSURANCE

All materials, components and equipment covered under this specification shall be procedure manufactured and tested at all the stages, as per a comprehensive quality programme. An indicative programme of inspection / tests to be carried out by the contractor for some of the major items is given in this specification. This is however, not intended to form a comprehensive programme as it is the contractor’s responsibility to draw up and implement such programme duly approved by the Owner. The detailed quality plans for the manufacturing activities should be drawn up by the bidder, and will be submitted to Owner for approval. Schedule for finalization of such quality plans will be finalized before award.

Manufacturing quality plan shall detail out for all the components and equipments, various tests, inspection, to be carried out as per the requirements to this specification and standards mentioned therein and quality practices and procedures followed by contractor’s Quality Control Organization, the relevant reference documents and standards acceptance norms, inspection documents raised etc., during all stages of material procurement, manufacture, assembly and final testing / performance testing.

The Bidder shall also furnish copies of the reference documents/ Plant Standard / Acceptance norms / Test and inspection procedure etc. as referred in Quality Plan along with Quality Plans. The Quality Plans and reference documents / standards etc, will be subject to Owner’s approval and will form a part of the contract. In these approved Quality Plan, Owner shall identify customer hold points (CHP) which shall be carried out in presence of the Owner’s Project Manager and beyond which work shall not proceed without, written consent of Owner’s Project Manager / Authorised representative in writing. All deviation to this specification, approved quality plans and applicable standard much be documented and referred to Owner along with technical justification for approval and dispositioning.

No material shall be dispatched from the manufactures works before the same is accepted subsequent to pre-dispatch final inspection including verification of records of all previous tests/ inspections by Owner’s Project Manager / Authorized representative and duly authorized for dispatch issuance of MDCC.

All materials used and supplied shall be accompanied by valid and approved materials certificates and tests and inspection reports. These certificates and reports shall indicate the heat numbers or other such acceptance identical numbers of the material. The material certified shall also have the identification details stamped on it.

All materials used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes / Standard. Details of results of the tests conducted to determine the mechanical properties, chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and / or agreed details.

All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX / BS –4870 or other International equivalent standard acceptable to the Owner.

All welding / brazing procedure shall be submitted to the Owner or its authorized representative for approval prior to carrying out the welding / brazing

All brazers, welders and welding operators, employed on any part of the contract either in Contract’s / his Sub- Contractors works or at site elsewhere shall be qualified as per ASME Section IX or BS-4871 or other equivalent International Standards acceptable to the Owner.

Test results of qualification tests and specimen testing shall be furnished to the Owner for approval. However where required by the Owner, tests shall be conducted in presence of Owner / Authorized representative

All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.

Results of all non-destructive testing shall be recorded on certificates.

All the sub-vendors proposed by the contractor for procurement of major bought out item including castings, forgings, semi-finished and finished components/equipment, list of which shall be drawn up by the Contractor and finalized with the Owner shall be subject to Owner’s approval. The Contractor’s proposal shall include vendor’s facilities established at the respective works, the process capability, process stabilization, QC Systems followed, experience list, etc. along with his own technical evaluation and shall be submitted to the Owner for approval prior to any procurement. Such vendor approval shall not relieve the Contractor from any obligation, duty or responsibility under the contract.

For components/equipment procured by the Contractors for the purpose of the Contract, after obtaining the written approval of the Owner, the Contractor’s purchase specifications and enquiries shall call for quality plans to be submitted by the suppliers along with their proposals. The quality plans called for from the vendors shall set out, during the various stages of manufacture, the quality practices and procedures followed by the vendor’s quality control organization, the relevant reference documents/standards used, acceptance level, inspection of documentation raised etc.

Such quality plans of the successful vendors shall be finalized with the Owner and such approved Quality Plans shall form a part of the purchase order/contracts between the contractor and the vendor, within three weeks of the release of the purchase order/contract for such bought out items/components, a copy of the same without price details but together with the detailed purchase specifications, quality plans and delivery conditions shall be furnished to the Owner by the Contractor.

The purchase specifications for the major bought out items, list of which shall be drawn up by the Contractor and finalized with the Owner shall be furnished to the Owner for comments and subsequent approval before orders are placed.

Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor’s or their sub-vendor’s quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.

The Contractor shall carry out an inspection and testing programme during manufacture in his works and that of his sub-contractor’s and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. He shall carry out all tests/inspections required to establish that the items/equipments conform to requirements of the specifications and the relevant codes/standards specified in the specifications, in addition to carrying out tests as per the approved Quality Plan.

Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Owner to reject the equipment if it does not comply with the specification when Installed or does not comply with the specification in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to the relevant specification standard, data sheet, drawings etc.

For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.

Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Owner/authorized representative.

**30.1.3 QUALITY ASSURANCE DOCUMENTS**

The Contractor shall be required to submit two sets of compact discs of the following Quality Assurance documents within three weeks after dispatch of the equipment:

* 1. The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
  2. Factory tests results for testing required as per applicable codes and standard referred in the specification.
  3. Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded:
     + - 1. When some important repair work is involved to make the job acceptable; and
         2. The repair work remains part of the accepted product quality.

iv) All the accepted deviations shall be included with complete technical details.

**31 TESTS**

31.1.4.1. If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be Compensation Event.

**32. CORRECTION OF DEFECTS**

* 1. The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
  2. Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer’s notice.

**33. UNCORRECTED DEFECTS**

* 1. If the Contractor has not corrected a Defect within the time specified in the Engineer’s notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

# D .COST OF CONTROL

**34. BILL OF QUANTITIES**

* 1. The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.
  2. The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

**35. CHANGES IN THE QUANTITES**

* 1. If the quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent provided the change exceeds 1% of initial Contract Price, the Engineer shall adjust the rate to allow for the change.
  2. The Engineer shall not adjust rates from changes in quantities if thereby the initial contract Price is exceeded by more than 15 per cent, except with the Prior approval of the Employer.
  3. If requested by the Engineer, the Contractor shall provide the Engineer with a detailed cost breakdown on any rate in the Bill of Quantities.

**36. VARIATIONS**

All variations shall be included in updated Programs produced by the Contractor.

**37. PAYMENT FOR VARIATIONS**

* 1. The Contractor shall provide the Engineer with a quotation for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given with seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.
  2. If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause 35.1 or the timings of its execution do not cause the cost per unit of quantity the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
  3. If the Contractor’s quotation is unreasonable, the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer’s own forecast of the effects of the Variation on the Contractor’s costs.
  4. If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the variation shall be treated as Compensation Event.
  5. The Contractor shall not be entitled to additional payment for costs which could have been avoided by giving early warning.

**38. CASH FLOW FORECASTS**

When the Program is updated, the Contractor is to provide the Engineer with an updated cash flow forecast.

**39. PAYMENT CERTIFICATES**

The Contractor shall submit to the Engineer monthly statements of the estimated value of work completed less the cumulative amount certified previously.

* 1. The Engineer shall check the Contractor’s monthly statement within 14 days and certify the amount to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 51(3) of the Contract Data (Secured Advance).
  2. The value of work executed shall be determined by the Engineer.
  3. The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
  4. The value of work executed shall include the valuation of Variations and Compensation Events.
  5. The Engineer may exclude any item certified in previous certificates or reduce the proportion of any item previously certified in any certificate in the light of later information.

**40. PAYMENTS**

* 1. Payments shall be adjusted for deductions for advance payments, retention and other recoveries in terms of the contract and deduction at source of taxes as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer within 60 days of the date of each certificate.
  2. Items of the Works for which no rate or price has been entered it will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

1. **COMPENSATION EVENTS**
   1. The following are Compensation Events unless they are caused by the Contractor.
2. The Employer does not give access to a part of the Site by the Possession Date stated in the Contract Data.
3. The Employer modifies the schedule of other contractors in a way which effects the work of the contractor under the contract.
4. The Engineer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
5. The Engineer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
6. The Engineer unreasonably does not approve for a subcontract to be let.
7. Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of Letter of Acceptance from the information issued to Bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
8. The Engineer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
9. Other contractors, public authorities, utilities or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
10. The advance payment is delayed.
11. The effect on the Contractor of any of the Employer’s Risks.
12. The Engineer unreasonably delays issuing a Certificate of Completion.
13. Other Compensation Events listed in the Contract Data or mentioned in the Contract.
    1. If a Compensation Event would cause additional cost or would prevent the work being completed before the intended Completion Date, the Contract Price shall be increased and / or the Intended Completion Date is extended. The Engineer shall decide whether and by how much the Contract Price shall be increased and whether any by how much the Intended Completion Date shall be extended.
    2. As soon as information demonstrating the effect of each Compensation Event upon the Contractor’s forecast has been provided by the Contractor, it is to be assessed by the Engineer and the Contract Price shall be adjusted accordingly. If the Contractor’s forecast is deemed unreasonable, the Engineer shall adjust the Contract Price based on Engineer’s own forecast. The engineer will assume that the Contractor will react competently and promptly to the event.
    3. The Contractor shall not be entitled to compensation to the extent that the Employer’s interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.
14. **TAX**
    1. As per the TGSPDCL procedures(prevailing now) the GST of 18% on the total value of labour portion of ECV will be shared on works contract where material &labour can be bifurcated in the ratio of 50:50 between the service provider(the contractor / agency) and service recipient(TGSPDCL). The 50% GST as mentioned above is to be paid by the service provider and the same will be reimbursed by the TGSPDCL on submission of the original receipt clearly earmarking on the receipt that it has been paid for the particular work which has been executed by the service provider and claiming reimbursement.
    2. As per the TGSPDCL procedures (prevailing now) the GST of 40% of 18% of ECV i.e.7.2% on the total value of the ECV will be shared on works contract where material &labour cannot be bifurcated. The 50% of GST i.e. 7.2% as mentioned above is to be paid by the service provider and the same will be reimbursed by the TGSPDCL on submission of the original receipt clearly earmarking on the receipt that it has been paid for the particular work which has been executed by the service provider and claiming reimbursement.
15. **CURRENCIES**

All payments shall be made in Indian Rupees

1. **RETENTION**

44.1 The Employer shall retain 6% from each payment due to the Contractor as stated in the Contract Data, Subject to a maximum of 5% of contract value.

* + 1. On Completion of the whole of the Works and on submitting all Operation and Maintenance Manuals, 50% of the total amount retained is returned to the Contractor and balance 50% after Defects Notice Period and the Employer has certified that all Defects notified by him to the Contractor before the end Defect Liability period have been corrected.
    2. On completion of the whole of the Works 50% of the total amount retained is paid to the Contractor

1. **LIQUIDATED DAMAGES**
   1. The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or milestone as stated in the contract Data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor’s liabilities.
   2. If the Intended Completion Date is extended damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the payment calculated from the date of payment to the date of repayment at the rates specified in Sub Clause 40.1
2. **SECURITIES**
   1. The Performance Security (including additional security for unbalanced bids) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The Performance security shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.
3. **COST OF REPAIRS**
   1. Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of Defects Correction periods shall be remedied by the Contractor at the Contractor’s cost if the loss or damage arises from the Contractor’s acts or omissions.

**E. FINISHING THE CONTRACT**

**48. COMPLETION**

48.1 Work should be completed within 1 month from the date of Handing over of site.

48.2 The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the work is completed.

**49. TAKING OVER**

* 1. The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

**50. FINAL ACCOUNT**

* 1. The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor’s account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the contractor’s revised account.

**51. OPERATING AND MAINTENANCE MANUALS**

* 1. If “as built” Drawings and / or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.
  2. If the Contractor does not supply the Drawings and / manuals by the dates stated in the Contract Data, or they do not receive the Engineer’s approval, the Engineer shall with hold the amount stated in the Contract Data from payments due to the Contractor.

**52. TERMINATION**

* 1. The Employer or the Contractor may terminate the contract if the other party causes a fundamentals breach of the Contract.
  2. Fundamental breaches of Contract include, but shall not be limited to the following:

1. The Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Engineer.
2. The Engineer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within 28 days.
3. The Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation.
4. A payment certified by the Engineer is not paid by the Employer to the contractor within 120 days of the date of the Engineer’s certificate;
5. The Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer.
6. The contractor does not maintain a security which is required.
7. The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
8. If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract.

For the purpose of this paragraph: “Corrupt practice” means the offering, giving receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition”.

* 1. When either party to the Contract gives notices of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 52.2 above, the Engineer shall decide whether the breach is fundamental or not.
  2. Notwithstanding the above, the Employer may terminate the Contract for convenience.
  3. If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

**53. PAYMENT UPON TERMINATION**

* 1. If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the differences shall be a debt payable to the Employer.
  2. If the Contract is terminated at the Employer’s convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor’s personnel employed solely on the Works, and the Contractor’s costs of protecting and securing the Works and less advance payments received upto the date of the Certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

**54. PROPERTY**

All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor’s default.

**55. RELEASE FROM PERFORMANCE**

If the Contract is frustrated by the outbreak of war or by another event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

**SPECIAL CONDITIONS OF CONTRACT**

S.NO. DESCRIPTION

1.1A RESPONSIBILITY FOR EXECUTION OF THE CONTRACT

1.1B NOTICES

2. WORKING HOURS

3. EXTRA SHIFTS AND OVER TIME WORK

4. ACCIDENTS

5. INSURNACE FOR MATERIALS SUPPLIED BY BOARD

5.1. INDEMNITIES

6. LICENSE

7. TRANSPORT ARRANGEMENT

8. MACHINERY TOOLS AND TACKLES

9. SAFETY PRECAUTIONS

10. FIRE PRECAUTIONS

11. WORKING AREA AND CLEANLINESS

12. SITE DISCIPLINE

13. SITE OFFICE AND SITE STORES

14. APPROVAL OF INSTALLATION BY GOVERNMENT             AUTHORITIES (CEIG)

15. MEASUREMENT OF WORK

16. INCOME TAX

17. TERMINATION OF CONTRACT FOR BOARDA CONVENIENCE

18. LABOUR

19. COMPLIANCE WITH LABOUR REGULATION

# SPECIAL CONDITIONS OF CONTRACT

**1. DESCRIPTION**

The Contractor shall, at all times during the continuance of the contract, comply full with all existing Acts, regulations and byelaws including all statutory amendments and reenactments of State or Central Government and other local authorities and any other enactments, notifications and acts that may be passed in future either by the State or the Central Government or local authority, including Indian workmen’s Compensation Act, 1923. Contract Labour (Regulation and Abolition) Act 1970, the Child Labour Prohibition and Regulation Act, 1986 an Equal Remuneration Act 1976, Factories Act, Minimum Wages Act 1948, Provident Fund Regulations, Employees Provident Fund Act 1952 EPF Act 1996 and related acts passed from time to time. Schemes made under the Same Act the Buildings and other construction workers (Regulation of Employment and condition of service) Act 1996, the Cess Act 1996 and also applicable Labour Regulations, Health and Sanitary Arrangement for Workmen, Insurance and other benefits and shall keep Employer indemnified in case any action is commenced by Competent authorities for contravention by the Contractor.

If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provision stipulated above on the part of the Contractor, the Engineer shall have the right to deduct from any moneys due to the Contractor, his amount of Performance Security or recover from the Contractor personally any sum required or estimated to be required for making good the loss or damage suffered by the employer, responsibility in connection with the employee of the contractor, who shall, in no case, be treated as the employee of the Employer at any point of time.

**1.1A RESPONSIBILITY FOR EXECUTION OF THE CONTRACT (CLAUSE 16 OF G.C.C.)**

The Contractor shall carry out the entire work according to sound engineering practices. The responsibility lies with the Contractor for the proper execution of the erection work according to existing laws and byelaws at the time of contract execution. The Contractor shall confirm in respects to the requirements of CEIG (Chief Electrical Inspector to Government of A.P.) as and when required by them. However, the Contractor shall have to follow the instructions of the Employer or his authorized representative in respect of the following:

* + 1. Progress report to be submitted from time to time
    2. Progress and completion of the work according to the time schedule
    3. Execution of contract work to the Purchaser’s entire satisfaction
    4. Submitting the details regarding the name of the responsible persons for execution of this contract.
    5. Preparing, submission and getting approval of the complete electrical system of the power plant including the switchyard, from the CEIG will be contractor’s responsibility.

**1.1B NOTICES:**

* + 1. All Certificates, notices or written orders to be given by the Employer to the Contractor under the terms of the contract shall be served by sending by post or delivering the same to the Contractor’s principal place of business, or such other address as the Contractor shall nominate for this purpose.
    2. All notices to be given to the TGSPDCL or to the Engineer under the terms of the Contract shall be served by sending by post or delivering the same to the respective address nominated for that purpose.

The TGSPDCL address is

**The Chief Engineer/Operation,**

**Medchal Zone, TGSPDCL,**

**Mint Compound, Hyderabad – 500004.**

The Engineer’s address is

Divisional Engineer /Opeartion/ Jogipet / Sangareddy Circle in charge of works

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **WORK HOURS (CLAUSE 12 OF G.C.C.)**

Before commencement of work, the contractor shall inform in writing, the normal working hours for his staff workers. These1 hours be as far as possible in consonance with the Employer’s working hours for better coordination.

All the staff and workers should positively leave the site premises after these hours, except for authorized watch and ward personnel, approved by the employer.

1. **EXTRA SHIFTS & OVERTIME WORK (CLAUSE 12 OF G.C.C.)**

At the commencement of work, the Contractor shall arrange for a general shift, as per working hours.

If, at a later date the employer feels that extra shifts should be started to complete the work allotted to the Contractor within the time stipulated or to make up for any past delays. The contractor shall arrangement for.

1. **ACCIDENTS (CLAUSE 12 OF G.C.C.)**

The employer will not be responsible for any damages or compensation payable in consequence of an accident or injuries to any of the Contractor’s personnel or any third party.

The Contractor shall insure at his cost-against any such eventually as per rules in force and submit the documentary evidence of the Insurance Policy taken, positively prior to commencement of work at site and should keep policy valid by paying premium and other changes till handing over of the plant.

In case of any accidents at or near the site in connection with the execution of work, the contractor shall 24 hours, make a detailed report of the accident and submit the same to the purchaser in the form provided by the purchaser. The contractor shall also report such accidents to the competent authority as laid down by the existing rules and regulations and inform the Employer regarding the same.

1. **INSURANCE FOR MATERIALS SUPPLIED BY BOARD (CLAUSE 13 OF G.C.C.)**

The Contractor shall insure in the name of the TGSPDCL for the amount equal to the value of material supplied to him by the TGSPDCL against loss or damage for the period from the time of taking over the materials from the TGSPDCL to the date of issue of completion certificate. The value of the policy shall be enhanced from time to time depending upon the value of the TGSPDCL materials taken over. NPDCL will reimburse the above insurance charges on submission of his claim together with insurance policy.

* 1. **INDEMNITIES :**
  2. The contractor is liable for and indemnifies the TGSPDCL against losses, expenses and claims for loss or damage to physical property, personal injury and death caused by his own acts or omissions.
  3. The contractor claiming indemnity to take all reasonable steps to mitigate the lower damage will occur
  4. The contractor indemnifies the TGSPDCL against claims to damages caused by the movement of his equipment or temporary works.
  5. The Contractor shall submit an “Indemnity Bond” to the TGSPDCL incorporating the above points before taking up the execution of the work.

1. **LICENCE (CLAUSE 16 OF G.C.C.)**

The contractor or his sub-contractor shall have valid contractor’s license from Electrical Inspector of Telangana State, and he shall maintain its validity for the complete duration of the contract.

1. **TRANSPORT ARRANGEMENT (CLAUSE 17 OF G.C.C.)**

The contractor shall make the transport arrangement at his cost for his staff and workers to site.

1. **MACHINERY, TOOLS & TACKLES (CLAUSE 17 OF G.C.C.)**

The Contractor shall provide the required machinery/equipment, accessories, necessary tools and tackles, instruments, and all the normal consumable materials required for the satisfactory execution of this contract. The Contractor shall arrange for cranes for unloading and erection purpose, if required.

Gate Pass for Materials:

All tools, tackles, construction materials, welding materials etc., will be taken inside the site limits only after registration with security personnel. Also any material will be taken out only on valid gate pass issued by Purchaser’s representative after checking the proper “IN” gate passes. The contractor shall have to preserve the “IN” gate passes obtained from security when every any material is route inside the site to enable taking back the balance/excess materials, Tools and Tackles after completion of Works.

**9. SAFETY PRECAUTIONS (CLAUSE 19 OF G.C.C.)**

All the safety measures to avoid accidents shall be followed strictly in accordance with the safety rules and regulation laid down by the government authorities.

The Contractor shall take all safety precautions and shall provide proper scaffolding, lifebelts, ladder shock proof helmets, etc. to avoid accidents and to ensure safety, of not only his personnel but also the safety of the staff and workers of other contractors working at the same site.

The contractor shall take necessary precautions to ensure that no part of the building/structure damage or disfigured due to negligence on his part while carrying out the work. In case of excess damage, the same shall be made good by the contractor immediately at his own cost. Recommissioning on energized equipment shall be carried out with proper safety permits issued by the Purchase/Competent authorities. When required to work at heights or at hazardous location areas, the contractor shall carry out the same with atmost care and all safety precautions.

**10. FIRE PRECAUTIONS (CLAUSE 19 OF G.C.C.)**

The contractor shall strictly instruct his site staff and workers to abide by the regulations sin force at the site regarding all precautions to be taken to avoid for hazards.

**11. WORKING AREA & CLEANLINESS (CLAUSE 21 OF G.C.C.)**

The Contractor shall keep the site of work in a clean and sanitary condition. After the completion of the entire work, the contractor shall arrange to remove all the temporary structures, surplus materials, dirt, debris, etc. from the site and finished work shall be handed over the employer in a clean and complete shape.

**12. SITE DISCIPLINE (CLAUSE 21 OF G.C.C.)**

Strict discipline shall be observed by all contractor’s personnel inside the premises of the site. The contractor and his personnel shall abide by all the rules and regulations of the Employer, Disciplinary action shall be taken against the Contractor/his personnel and their services liable to be terminated, if found quarreling violating the rules.

**13. SITE OFFICE & STORES (CLAUSE 21 OF G.C.C.)**

The contractor will make necessary arrangements for erection of his site office and site stores after getting written permission from the employer to erect such temporary structure at his own cost. Temporary power supply will be provided at one point on chargeable basis at the nearest switch room and further cabling upto the contractor’s office or work is included in the Contractor’s scope. Every meter of adequate rating and associate equipment for construction power distribution is in the Contractor’s scope. The Contractor shall indicate construction power requirement in the Offer. The power consumption charges will have to be borne by the Contractor. However the non availability of the Crane does not leave the contractor off his responsibilities. The contractor is permitted to make use of water source available if any sub-station sites for construction purpose. Transport of water from the source to the working areas will be contractors responsibility.

**14. APPROVAL OF INSTALLATION BY GOVERNMENT AUTHORITIES (CEIG)**

Whenever approval of government authorities is requires, as per existing rules and regulations, the Contractor shall obtain the same.

**15. MEASUREMENT (CLAUSE 42 OF G.C.C.)**

The Engineer shall, except as otherwise stated ascertain and determine by measurement the value in terms of the contract of work done in accordance with the contract. He shall, when required any part or parts of the works to be measured, give notice to the contractor’s authority agent or representative, who shall forth with attend or send a qualified agent to assist the Engineer or the Engineer’s Representative in making such measurement, and shall furnish all particulars required by either of them. Should the contractor not attend or neglect or omit to send such agent, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work. For the purpose of measuring such permanent work as is to be measured by records and drawings, the Engineer’s representative shall prepare records and drawings month by month of such work and the Contractor, as and when called upon to do so in writing, shall within fourteen days, attend to examine and agree such records and drawings with the Engineer’s Representative and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records, and drawings, they shall be taken to be correct. If, after examination of such records and drawings the contractor does not agree the same or does not sign the as agreed, they shall nevertheless be taken to be correct, unless the contractor shall, within fourteen days of such examination, lodge with the Engineer’s Representative, for decision by the Engineer, notice in writing of the respects in which such records and drawings are claimed by him to be incorrect. Payments will be made to the contractor by cheque at monthly intervals. The contractor shall submit his bills for work accomplished and measured by Engineer on or before the last of month.

**16. INCOME TAX (CLAUSE 42 OF G.C.C.)**

a) Deductions will be made towards Income Tax at source by the TGSPDCL as directed by Income Tax Department.

b) The Contractor’s staff, personnel and labour will be liable to pay personnel income taxes in India in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

**17. TERMINATION OF CONTRACT FOR TGSPDCL CONVENIENCE (CLAUSE 52.4 OF G.C.C.)**

The TGSPDCL shall be entitled to terminate this contract any time for the TGSPDCL convenience after giving 30 days prior notice to the contractor with a copy to the Engineer.

**18. LABOUR:**

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements, for the engagements of all staff and labour, local, or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor’s Equipment as the Engineer may require.

**19. COMPLIANCE WITH LABOUR REGULATIONS:**

During continuance of the Contract. The Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, byelaws that may be passed or notification that may be issued under any labour law in future either but the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the Competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

Salient features of some major labour laws applicable to establishments engaged in building and other construction work.

* + - 1. Workmen Compensation Act 1923:- The Act provides for compensation is case of injury by accident arising out of and during the course of employment.
      2. Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishment employing 10 or more employees.
      3. Employees P.F. and Miscellaneous Provision Act 1952: The Act provides for monthly contributions by the employer plus workers @ 10% or 8.33 %. The benefits payable under the Act are:

1. Pension or family pension on retirement or death, as the case may be.
   * + - 1. Deposit linked insurance on the death in harness of the worker.
         2. Payment of P.F. accumulation on retirement/death etc.
       1. Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
       2. Contract labour (Regulation 7 Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.
       3. Minimum Wages Act 1948: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.
       4. Payment of Wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
       5. Equal Remuneration Act 1979: The Act is provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
       6. Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employee drawing Rs.3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.
       7. Industrial Disputes Act 1947: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations or lock-out becomes illegal and what are the requirements of laying off or retrenching the employees or closing down the establishments.
       8. Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.
       9. Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employees. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
       10. Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 of age in certain occupations and process and provides for regulations of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.
       11. Inter-State Migrant workmen’s (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.
       12. The Building and Other Construction worker (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: All the establishment who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
       13. Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

### SECTION 4

#### CONTRACT DATA

##### CONTRACT DATA

**Item marked “N/A” do not apply in this Contract.**

The following documents are also part of the Contract:

Clause

###### Reference

* + - * + The Schedule of Operating and Maintenance Manuals (51)
        + The Schedule of Other Contractors (8)
        + The Schedule of Key Personnel (9)

The Borrower TGSPDCL (1.1)

Loan given by PFC. (1.1)

The above insertions should correspond to the information provided in the Invitation of Bids.

The Employer is

Name and Address :

The Chief Engineer/Operation,

Medchal Zone, TGSPDCL,

Mint Compound, Hyderabad –500004.

**Name of authorized Representative**: Divisional Engineer/ Operation / Jogipet / Sangareddy Circle.

The Engineer is

**Name:** Divisional Engineer/ Operation / Jogipet / Sangareddy Circle.

**Address:** TGSPDCL/Hyderabad

The name and identification number of the Contract is Bid No.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Insert name and number as indicated in the Invitation for Bids (or Prequalification, if any) (1.1)

The Works consist of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Brief Summary, including relationship to other contracts under the Project)

The Start Date shall be Date of Handing over of site (1.1)

The Intended completion Date for the whole of

The Work is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the following milestones: (17,28)

Milestone dates:

Physical works to be completed Period from date of issue of

Notice to proceed with the work

Milestone 1 i.e. 25% of quantum work One month from the start date

Milestone 2 i.e. 50% of quantum work Two months from the start date

Milestone 3 i.e. 75% of quantum work Three months from the start date

Milestone 4 i.e. 100% of quantum work Four months from the start date

The following documents also part of the Contract: (2.3)

The Contractor shall submit a revised Program for the Works

Within 30 days of delivery of the Letter of Acceptance. (25)

The Site Possession Dates shall be : (21)

Section 1}

Section 2} Within a month after entering into Agreement

Section 3}

The Site is located at ………………… (1)

And is defined in drawings No’s…………….

The Defects Liability Period is 180 days from the date of issue of completion certificate (32)

The minimum insurance cover for physical property, injury (41)

And death if Five (lakhs) per occurrence with the number of occurrences

Limited to four. After each occurrence, contractor will pay additional premium

Necessary to make insurance valid for four occurrences always.

The following events shall also be Compensation Events: (25)

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The period between program updates shall be 30 days. (25)

The amount to be withheld for late submission of an updated Program shall be Rs.25000/-

(27)

The language of the Contract documents in English (3)

The law which applies to the Contract is the law of India (3)

The currency of the Contract is Indian Rupees. (43)

Institution whose arbitration procedures shall be used: (24)

The proportion of payments retained (retention money) shall be 5% from each bill subject to a maximum of 5 % of contract value (44)

The liquidated damages for the whole of the works are at Rs.0.05% on the estimated cost per day (amount) per day and that for the milestone are as under:

The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price. (45)

# SECTION 5

**TECHNICAL SPECIFICATIONS**

**TECHNICAL SPECIFICATION**

**Scope of the Work:**

The scope of the specification covers the following

“Providing of 33KV alternate source of supply to 33/11KV Andole (new) SS from 132KV/33KV Jogipet EHT Sub-Station by erection of 33KV interlinking SCOH line with 100sq.mm AAA conductor for a distance of 10.2KM over now proposed 11Mtrs PSCC Poles in Andole Section of Jogipet Sub-Division of Jogipet Division in Sangareddy Circle under T&D Improvements to original works”.

**1 General**

The Contractor should be conversant with Indian Electricity Rules 1956 as amended from time to time.

**2 Site Work**

All works to be carried out in a workman like manner to minimize interference to others. In particular excavations must be guarded. Adequate precautions must be taken to prevent damage or injury to the persons and live stock.

**3 Storage**

The contractor shall establish temporary stores at his own cost at the Sub - Station site for storing the cement and other Electrical equipment. It is the responsibility of the contractor to take all precautions for safety of the equipment / Materials at his own cost. The stores shall be dismantled and the site shall be cleared after the work is completed.

**4 Supervision, Skilled and Unskilled Labor.**

The contractor shall employ experienced, technically qualified, and supervising Engineers for supervision. The contractor shall engage only competent skilled workers. Proof of personnel working under the contractor as employees shall be on the rolls of the contracting company.

**5 TGSPDCL’s and Contractor’s Risk**

The TGSPDCL carries the risks which this Contract states are TGSPDCL’s risks, and Contractor carries the risks which this Contract states are Contractor’s risks.

**6 TGSPDCL’s Risks**

The TGSPDCL is the responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the TGSPDCL’s country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, insurrection or military or usurped power, civil war, riot commotion or disorder (Unless restricted to the Contractor’s employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the works, other than the Contractor’s design.

**7 Contractor’s Risks**

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

**8 Insurance:**

Contractor shall provide, in the joint names of the TGSPDCL and the Contractor, insurance cover from the start date to the end of the defects liability period, in the amounts and deductibles stated in to the Contractor Data for the following events which are due to the Contractor's risks:

1. Loss of or damage to the Works, Plant and Materials:
2. Loss of or damage of Equipment
3. Loss of or damage of property (except the Works, Plant, Materials and Equipment in connection with the Contract; and
4. Personal injury or death.

Policies and certificates for insurances shall delivered by the Contractor to the Engineer for the Engineer's approval before the start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

If the Contractor does not provide any of the policies and certificates required, the TGSPDCL may affect the insurance which the Contractor should have provided and recover the premiums the TGSPDCL has paid from payments otherwise sue to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due. Alternations to the terms of insurance shall not be made without the approval of the Engineer.

Both parties shall comply with any conditions of the insurance policies.

**9 Water and Power:**

The Contractor has to make use of the water supply available, if any, at the Sub- Station site for construction purpose. Transports of water from the source to the working area will the responsibility of the contractor. In case water is not available, at site, the contractor has to make his own arrangements and any extra claim on account of this will not be entertained. Power required for construction will be made available at one point on chargeable basis. The power shall be exclusively used for the works awarded in the contract. If power is not available at site, the cost of bringing of power to site should be with the Contractor as per the terms and conditions of the TGSPDCL.

**10 Pumping:**

The Contractor is responsible for pumping or channeling all pumped water from excavations to the nearest ditch, to avoid damage to neighboring land and they will be held responsible for cleaning out the ditch should this become sited up due to pumping operations.

**11 Public Relations:**

Particular attention should be paid by the Contractor and his workmen to maintain

public relations.

**12 Definitions**

**12.1 Contractor**

The Contractor is a person or corporate body whose bid to carry out the works has been accepted by the TGSPDCL.

**12.2 Defect :**

A defect is any part of the works not completed in accordance with the contract.

**12.3 TGSPDCL :**

The TGSPDCL (TGSPDCL) is the party who will employ the Contractor to carry out the works.

**12.4 Engineer :**

The Engineer is a person appointed by the TGSPDCL (TGSPDCL) who is responsible for supervising the Contractor, administering the Contract.

**12.5 Materials :**

Materials are all supplies, including consumables, used by the Contractor for incorporation in the works.

**12.6 Specification :**

Specification means the specification of the works included in the Contract and any modification or addition made or approved by the Engineer.

**12.7 Subcontractor :**

A Subcontractor is a person or corporate body who has a contract with the Contractor to carry out a part of the work in the Contract which includes works on the site.

**12.8 Works :**

The works are what the Contract requires the Contract to construct, install, and hand over to the TGSPDCL as defined in the Contract Data.

**13** **In respect of civil Works**, the contractors should produce samples of all building materials, such as lime, bricks, stone, aggregate and doors and windows fittings and sanitary appliances, sewage pipes, tiles etc., well in advance and got written approval before the ordering and fulfilling. When on work one sample of each will be kept with the Chief General Manager, for reference till the final stage of the work.

**14** **In respect of Electrical works, t**he contractors should produce samples of all electrical materials, such as earth pipes, lugs, distribution boxes, GI strip, GI wire, GI Pipes, MS Pipes, Cement pipes, hume pipes, cement slabs, PVC Pipes, wires, fuses, fuse bases etc., if required to be supplied by the Contractor well in advance and got written approval before the ordering and fulfilling. When on work one sample of each will be kept with the Chief General Manager, for reference till the final stage of the work.

**15** **NATURE OF WORKS:** The works involves the emergency nature, hence the work shall also to be carried out on Sundays and other public holidays as will be intimated by the department from time to time. The work shall be carried out on all working days during day & night hours as per the necessity by the field conditions.

The works should be attended during the Line Clears in various weather conditions under supervision of the departmental staff, no compensation or any other payments will be made for such waiting period for getting the Line Clears. The contractor has to pre plan the works to be done for getting the proper scheduled line clears. The line clears will be given by the Department.

No assistance expect as stated already in the above para will be extended by the department. The contractor would proceed with the work diligently and complete work as required without causing any inconvenience to the department.

**16 HANDLING OF THE MATERIAL & EQUIPMENT:** The contractors are responsible for the proper handling and transporting of the materials from stores to site and vice versa at his own cost including loading & Un - loading & transporting charges with their own vehicles.

It is the responsibility of the contractor to keep safe custody of materials given to him and he is bound to pay the value of material damaged or loss if any during transport or theft.

All the balance, left over, dismantled, removed, damaged and Un – Serviceable materials &equipments including Iron materials shall be handed over back to the Stores through concerned Asst. Engineer after completion of the given work.

**17 SAFETY MEASURES:** The Contractors shall take all necessary precautions for the safety of workers and preserving their health while working in such jobs as require special protection and preventive steps. The following are some of the placing of mortar or concrete in place where the work is done too much wet conditions.

Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle them independently and taking all necessary precautions in and around the areas where machines hoists and similar units are working.

The contractor has to provide safety equipment to his staff & workers at his cost only. It is the responsibility of the contractor to insure the personal working under his control.

The TGSPDCL, is not responsible in any manner for any accident occurred to his staff or labour while execution of the works. The responsibility lies with contractor only.

The work should be done with the qualified & experienced persons only. The work should be done as per the specification given to him and as per the latest instructions given by the TGSPDCL, works in charge time to time.

**18 TOOLS AND PLANT:** The contractor should arrange all the T&P, men, machinery and transport vehicles at his own cost.

**19 Explosive and Fuel Storage Tanks.**

No explosive shall be stored within half a mile of the limits of the camp sites. The storage of gasoline (petrol and other fuel oils, or other inflammable materials) shall confirm to the regulations for such storage issued by the State and Central Government Fuel Storage takes above ground of a capacity in excess of 1350 liters (300 gallons) shall not be located within the camp area not with 91.5 m (300 ft) of any building or habitation.

**20 Cleaning up the site:**

Before commencement of works, the site shall be cleaned and dressed with an approved weed killer.

During construction, the Contractor shall keep the work site and storage area used by him free from accumulation of waste materials or rubbish and before completing the works. The Contractor shall at his own cost, remove or dispose off in a manner satisfactory to the Engineer in charge. All holes in the ground shall be filled in and the land restored to its original state and the entire premises should be kept in a neat and tidy condition of cleanliness as the Engineer may direct. Any damage done to the TGSPDCL by the Contractor or his Sub-Contractor shall be made good at Contractor's expense.

## I. FOR 11 KV & 33 KV HG FUSE SET

**1. SCOPE:**

This specification provides for the manufacture, testing before despatch, supply and delivery of 11 kV HG Fuse sets for use on the distribution side as per the particulars given in the schedule attached.

**2. STANDARDS:-**

The HG Fuse sets shall conform in all respects to the clause (4) Technical particulars given below. The Insulators conform to IS: 5350 and IS: 731/1971 (latest version).

**3. CLIMATE CONDITIONS:**

The climatic conditions under which the equipment shall operate satisfactorily are as indicated in Page (3) of General and Financial terms and conditions for supply of materials.

**4. CONSTRUCTION.**

All ferrous parts shall be hot dip galvanized as per IS:2633. The fuse sets are meant for mounting on a structure at a height of 4.5 meters to 5.0 meters from ground level suitable for single pole distribution transformer structure.

The porcelain parts shall be permanently secured at the centre in a metal support o

be mounted on the supporting structure. They shall be made up of interchangeable units and shall be capable of being mounted on the supporting structures. Suitable bolts, washers required shall also be supplied with the insulators. The portion of the central metallic support where it grips the insulator should be insulated to that level of the insulator to avoid bird faults.

The porcelain shall be sound and homogenous, free from defects, laminations and

other flaws or imperfections which might effect the mechanical or dielectric

strength. These should be thoroughly verified and shall be tough, impervious to

moisture and smoothly glazed.

All the ferrous metal parts excluding mounting angles shall be hot dip galvanized. The mounting angles shall be painted with double coat of red oxide paint. The porcelain and metal parts shall be assembled in such a manner that any thermal expansion differential between the metal and porcelain parts throughout the range of temperature variation shall not loosen the parts or create undue internal stresses which may affect the electrical or mechanical strength and rigidity. The insulators shall conform in all respects to IS:5350 and IS:731/1971.

All the bolts and nuts shall be hot dip galvanized.

**5. TECHNICAL PARTICULARS 11 KV & 33 KV HG FUSE SET :**

5.1.1. Rated Current : 50 A

5.1.2. Rated Voltage : 36 kV

5.1.3. Rated Insulation level **11 KV 33 KV**

a) Power frequency withstanding voltage :

i) To earth and between poles : 28 kV (rms). 36 kV (rms)

ii) Across isolating distance : 32 kV (rms). 75 kV (rms)

b) Impulse withstand voltage :

i) To earth and between poles : 75 kV (Peak). 175 (Peak)

ii) Across isolating distance : 85 kV (Peak). 190 (Peak).

5.1.4. Temperature rise : 50 Deg. C above ambient temp.

5.1.5. Resistance across the terminals. : 1 m. Ohm. 0.5 m. Ohm

(excluding fuse wire resistance)

5.1.6. The Gap for the fuse wire shall be : 203 mm. 457.5 mm

Phase to phase clearance of the : 600 mm 1524 mm

Fuse set shall be.

Insulator support height including : 254 mm. 508 mm

Insulator diameter shall be

(30x5 mm M.S Flat)

Arcing horn bending portion shall be : 75 mm 200 mm

Arcing horn bending portion shall be : 383 mm. 351 mm

( i.e., from 60 degree angle)

**5.2.0. INSULATORS :**

5.2.1. Make : Any standard make.

5.2.2. Type : Solid Core insulators.

Power frequency with stand voltage : 35 kV (rms.) 75 kV (rms.)

Dry/Wet.

Impulse withstand voltage : 75 kV (rms). 170 kV (rms.)

Visible discharge voltage. : 9 kV (rms) 36 kV kV (rms.)

Creepage distance : 260 mm. 580 mm

(Moderately polluted atmosphere)

Flash over voltage Dry/Wet. : 60kV/ 40 kV.

Total length of the insulator shall be : 350 mm ± 5 508 mm ± 5

Dia of the insulator shall be : 85 mm ± 5. 200 mm ± 5

**6.0. TESTS:**

**6.1. TYPE TESTS:**

i) Lightning Impulse withstand test.

Power Frequency voltage withstand test (Dry).

Power Frequency voltage withstand test ( Wet).

Temperature rise test.

Measurement of resistance.

**6.2. ACCEPTANCE TESTS.**

i) Verification of Dimensions.

Galvanising test.

Temperature rise test.

Measurement of resistance.

Dielectric test (with 1000V Megger).

Power frequency voltage withstand test (Dry).

**6.3. ROUTINE TESTS:**

i)Verification of Dimensions.

Temperature rise test.

Measurement of resistance.

Dielectric test (with 1000 V Megger).

Power frequency voltage withstand test (Dry).

**7. TESTS & TEST CERTIFICATES :**

The tests shall be carried out as per clause (6) above and relevant ISS for both HG Fuse sets and the insulators before dispatch and the test certificates shall be furnished for approval.

8. **INSPECTION** : All the Routine and acceptance tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed to by the manufacturer and purchaser at the time of purchase. The manufacturer shall be offer the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that materials are being furnished in accordance with this specification.

The purchaser has the right to have the tests carried out at supplier cost by an independent agency whenever there is dispute regarding the quality of supply.

**9. PACKING** : the 11kV HG Fuse sets shall be delivered suitably packed. Although the method of packing is left to the discretion of the manufacturer, it should be robust for rough handing, that is occasioned during transportation by rail/ road.

**10. GUARANTEED TECHNICAL PARTICULARS:**

The technical particulars as specified at clause (5) above shall be guaranteed and a statement of guaranteed technical particulars covering those listed in the enclosure to this section also shall be furnished along with the tender.

**11. GENERAL**:

i) Only standard make solid core insulators are to be used in the manufacturer of HG Fuse set and not post type insulators with local cementing. This shall be clearly confirmed in the tender.

ii) Any design other than one specified herein may also be offered. However, the TGSPDCL reserves the right to make purchase according to specification.

# II.CONSTRUCTION STANDARDS FOR 11KV AND 33KV OVER HEAD LINES

**1. Scope:**

The Scope covers the survey of the proposed route marking pole locations, tree cutting and obtaining way leave clearance wherever necessary, transport of material to the locations, erection of line, testing of the line and handing over the line to the Employer as per specification.

**2. General:**

The Contractor should be conversant with Indian Electricity Act 2003, Indian Electricity Rules 1956 and Indian Telegraph Act 1989 as amended from time to time.

**2.1 Site work:**

All works to be carried out in workman like manner to minimize interference to farming. In particular excavations must be guarded. Watercourses, drains etc., must be kept clean and must not be allowed to become blocked with site material. Adequate precautions must be taken to prevent damage or injury to persons and live stock.

**Animals:**

No animal shall be brought on or near to the site.

**Site Damage**

Land damage should be confined to as small an area as possible. Poles and other materials should be placed alongside access routes as close to pole position as possible and neatly stacked. Where the making of conductor joints necessitates the cutting back of conductor strands, tarpaulin sheets must be used for the collection of conductor strand trimmings etc. any dangerous material such as wire trimmings, barbed wire, crates etc must not be left on site.

**Storage**

Way leave and / or access facilities do not allow for long term storage of materials on site. Materials must be tidily stored. All waste material must be removed from site by the end of the working day. .

**Pumping:**

The Contractor is responsible for piping or channeling all pumped water from excavations to the nearest ditch, to avoid damage to crops and neighbouring land and they will be held responsible for the cleaning out the ditch should this become silted up due to pumping operations.

**Care of soils in un-surfaced land**

When the carrying out of works will have an adverse effect on the physical condition of agricultural and other un-surfaced land, the works should be planned to reduce the occupation time to a minimum.

Low ground pressure vehicles to be used by the Contractor to minimise damage to the soil structure. All excavated soils should be reinstated in the correct sequence.

When back filling is completed sufficient top soil should be heaped over the excavation(s) to allow for settlement.

**Site Maintenance**

Particular attention should be paid by the Contractor and his workmen to public relations. These involve ensuring that farm roads or tracks kept clear of obstructions. No Dogs or other animals are to be brought on site.

**3. Definitions**

The following definitions apply to the specification, design and construction of over headlines:

**Auxiliary Equipment**

Equipment other than that forming part of this line design which may be placed on supports, such as transformers, switchgear etc.

**Average Span**

The arithmetic average length of a number of spans in a line or section of line.

**Basic Span / Ruling Span**

The span length adopted for sag / tension calculations.

**Maximum Span**

The maximum span length permitted using normal conductor spacing.

**Conductor**

Any conductor of electrical energy

**LT Distribution Line**

A line fed from a distribution transformer, providing a supply to more than one customer, separately tapped.

**Conductor Down pull**

The vertical loading imposed by the conductors corresponding to a gradient measured between adjacent points of support.

**Engineer**

Means the person appointed by the Employer (TGSPDCL) to act as Engineer for the purposes of this contract.

**Contractor**

Means the person whose tender has been accepted by the Employer and the legal successors in title to the Contractor but not (except with the consent of the Employer) any assignee of the Contractor.

**Failure Containment**

Provision of a double pole structure and stays at strategic points along the line to prevent cascade failure along the entire line.

**Flying Stay**

A means of providing a horizontal load to an angle support where it is impractical to use the conventional method of staying.

I**ntermediate Support**

A support in a straight run of a line on which the conductors are supported on pin insulators.

**Offset Arrangement**

An arrangement where the conductors are supported offset from the pole by means of a side arm and strut

**Over Tensioning**

Excess tension applied above normal theoretical design tension at the time of erection.

**Pre Tensioning**

The tension treatment applied to a conductor before final erection tension is established.

**Recommended Span**

The average span length in any section to which the line should be planned individual spans will normally be within +10% to -20% of the chosen basic span.

**Sag**

The vertical distance, under any system of conductor loading, between the conductor and a straight line joining adjacent supporting points, measured mid-span.

**Span**

The horizontal distance between adjacent supports.

**Stay**

High tension steel wire with insulators and fittings that transfers the pole top conductor tension to a ground anchor maintaining the balance of the structure.

**Strut**

Any support that carries a compressive force caused by conductor tension.

**11 KV Trunk Line**

Main 11 KV line from the 33 KV substation to the tailend of the 11 KV line.

**11 KV Spur Line**

All tapping 11 KV lines from the 11 KV trunk line.

**Cum-a-long clamp**

A clamping device which is attached to and holds the conductor during tensioning.

**Terminal support or Dead End Support**

A support at which the conductors are terminated on one side of the support only.

**Termination**

The end of the conductor which is securely fixed to an end fitting.

**Wind loading span**

The wind loading span associated with any support is half the sum of the spans adjacent to the support.

**4.Survey of the Route**

Over head lines are mainly routed over private property consisting of farm land, gardens, buildings, forests, play grounds and parks. Hence it is the duty of the Contractor to carry out site work with due care and attention to avoid any type of inconvenience to land owners or public.

The Contractor is required to conduct reconnoiter survey of the area in which the line has to pass. The main aim of the survey is to find out most economic route. While surveying the following points should be kept in view.

Shortest route practicable

As near to the road as possible to facilitate easy transport of materials, easy erection and easy maintenance.

Future load growth

The number of angle points should be minimum

Failure Containment – Cutpoints / DP angle poles.

The areas to be avoided are Proximity to aero dromes

Natural hazards like steep valleys, hills, forests etc and lakes, gardens, playing grounds.

Difficult crossings such as rivers, railway lines.

Restricted access for transport vehicles.

Buildings containing explosives

Sensitive areas such as wild lands, bird or wild life sanctuaries, bird habitants, culturally and historically important resources.

Care to be taken to see that tree cutting and compensation is minimum.

Having provisionally fixed the route on the survey map, Contractor has to carry out the detailed survey with theodalite and angle points are to be fixed and marked with survey stones. Then a route map is to be prepared by the Contractor showing the proposed line and various railway lines, communication lines, EHT lines, rivers and stream crossing on Survey of India map 1:50,000.

All LT lines along with pole locations ae to be marked on Adangal map / Patwari map of that particular village (16” = 1 mile)

After fixing the angle points, intermediate spans are to be fixed, keeping the spans uniform in length. They shall be as near as possible to the basic design span, indicated in the schedule.

In hilly areas poles are to be provided on ridges to maintain proper ground clearance. Poles should not be placed along the edges, cuts or embankment or along the banks of creaks of streams.

Failure containment poles are to be provided at 1.0 KM length for 11 KV and 33 KV lines.

For 11 KV and 33 KV lines, the Contractor must provide a ground profile with pole positions. Conductor sags and ground clearances marked for approval by the Engineer.

Contractor is responsible for any damage caused due to protruding pegs marked during survey.

**4.1 Provide Failure Containment**

A failure containment structure shall be provided every 1000m to prevent cascade failure along the entire line. A failure containment structure shall be one of the following.

An in-line double pole stayed in both directions – Drawing No H9 and H 16

A double pole section angle DRG No H 13 and M 15

A four pole section angle Drawing H 14 and M7

A double pole dead end drawing H 15.

**4.2 Way Leaves**

After finalization of the route, the Contractor shall submit proposals for way leaves and right of way to TGSPDCL for approval by the following bodies:

State level power telecommunication coordination committee.

Railway authorities if it involves railway crossing.

Forest authorities if it passes through forest areas.

Airport authorities if the line is nearer to airport.

If the line has to pass through prohibited areas (like pulicot lake etc.,) permission to be taken from competent authorities.

**4.3 Tree Cutting**

Tree cutting shall be done by the Contractor as mentioned below:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Voltage** | **Tree Clearance Required** | **Relaxation** |
| 1. | LT | All growth within 3.1 Mts on either side of the line and all trees that may fall and foul the line | NIL |
| 2. | 11 KV Spur lines | All growth within 4.6 mts on either side of the line and all trees that may fall and foul the line | In case of betal leaf gardens 3.1 mts on either side of the line. |
| 3. | 11 KV trunk lines and 33 KV lines | All growth within 6.1 mts on either side of the line and all trees that may fall and foul the line | NIL |

The Contractor has to mark the trees for felling, by a ring of white paint at one meter height from ground level and submit the proposals to the Engineer for obtaining permission from competent authorities.

If the line has to pass through gardens, orchards requiring tree cuttings, TGSPDCL must pay compensation to the owners as fixed by the concerned authorities (Department of Horticulture or department of forest etc.,) before tree cutting.

The Employer will obtain permission within reasonable time after submission of proposals by the Contractor. The Contractor shall arrange for tree cutting or tree branches cutting also without any extra claim.

The Contractor shall take all possible steps to see that standing crops etc., are not damaged while attending to tree cutting. When such damage is inevitable, the Contractor shall inform and obtain the prior permission of the Engineer for the financial commitment and trees shall not be cut, until the Employer has made necessary arrangements with the authorities concerned and permission is given to the Contractor to fell such trees. The Contractor shall arrange to remove the cut trees as soon as possible, stack them neatly in one place and hand over to the Employer.

TGSPDCL will endour to obtain rights of way for excavation of pole pits, Tree cutting etc prior to Contractor starting the work. Where the necessary permissions are delayed by the owner of the land TGSPDCL shall not be liable for any delay caused to the Contractor’s work programme and the Contractor shall be expected to shift gangs to other areas.

The rates quoted shall cover all such contingencies and no extra payment is allowed.

**4.4 Final Approval for Commencement**

The Engineer shall give final approval in writing for the route before the Contractor may start work.

The Contractor shall not commence the work until the final approval of the route map is given by the Engineer in writing to the Contractor.

**4.5 Liaison with other authorities**

Before undertaking any work on trunk roads, railways or telecommunication lines, permission is to be obtained from relevant authority.

**5.0 Clearances**

Minimum clearances to power conductors are to be maintained as per I.E Rules 1956. These minimum clearances are statutory and shall be maintained at all times.

For the purpose of arriving at the vertical clearance, the maximum sag is to be calculated taking into account the highest conductor temperature as specified in the sag tables.

For the purpose of arriving at the horizontal clearance, the maximum deflection of conductor based on the maximum wind pressure in the zone is to be taken into account or deflection upto 45o from the vertical towards the object is to be assumed and clearances measured. The clearances apply in any direction.

The angle of crossing of power and telecom lines shall be as near to the right angle but not less than 60o in any case.

Standard guarding are to be provided and earthed at crossings of telecom lines and power lines.

Special consideration needs to be given to all clearances in the vicinity of recreation sites.

For crossing any railway track Indian Electricity Rules and the regulations of railway authorities are to be followed.

An additional vertical clearance of 300 mm must be allowed to compensate for long term creep than those mentioned in the charts.

**5.1 Clearances to Ground and Roads**

**(Distance in Meters)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Item** | **LT** | **11 KV** | **33 KV** |
| 1. | Minimum vertical clearance to over head line conductor |  |  |  |
|  | a) Across the street | 5.8 | 6.1 | 6.1 |
|  | b) Along the street | 5.5 | 5.8 | 5.8 |
|  | c) At other places than mentioned in (a) and (b) | 4.6 | 5.2 | 5.2 |

**5.2 Maximum Span**

In case of overhead lines carrying LT, 11 KV and 33 KV voltage conductors, when erected in, over, along or across **any street**. The maximum span shall not exceed **60 mts**.

**5.3 Clearances to Buildings**

**(Distance in Meters)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Item** | **LT** | **11 KV** | **33 KV** |
| 1. | Minimum Vertical clearance to Buildings | 3.0 | 3.7 | 3.7 |
| 2. | Minimum Horizontal clearance to buildings | 1.22 | 1.22 | 1.82 |

**5.4 Clearances to communication lines**

**(Distance in Meters)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **Item** | **LT** | **11 KV** | **33 KV** |
| 1. | Minimum Vertical clearance between power and communication lines | 1.38 | 2.14 | 2.44 |

**5.5 Clearances Between Power Lines when crossing each other**

**(Distance in Meters)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Voltage** | **LT** | **11 KV** | **33 KV** |
| 1. | LT lines | 2.44 | 2.44 | 2.44 |
| 2. | 11 KV and 33 KV | 2.44 | 2.44 | 2.44 |
| 3. | 132 KV | 3.05 | 3.05 | 3.05 |
| 4. | 220 KV | 4.58 | 4.58 | 4.58 |
| 5. | 400 KV | 5.49 | 5.49 | 5.49 |
| 6. | 800 KV | 7.94 | 7.94 | 7.94 |

**5.6 Clearances to Railway Track**

Railway crossings are classified into three categories as mentioned below:

|  |  |  |
| --- | --- | --- |
| Category ‘A’ | : | Tracks electrified on 1500 volts D.C.System (Eg: Bombay city area) |
| Category ‘B’ | : | Tracks already electrified and likely to be electrified on 25 KV A.C.System in near future. |
| Category ‘C’ | : | Tracks not likely to be electrified in the foreseeable future. |

**Special Note:**

These are the minimum clearances to be maintained to the lowest portion of any

conductor of a crossing including guarded wire under conditions of maximum sag.

Lines drawn upwards from the outer most guard wire to the center at an angle of 45o to

the vertical, shall totally enclose the power conductors.

The structures are to be located in such a way that from the centre of the nearest railway track the distance shall be height of the structures +6 meters.

The span of crossing is to be restricted to 80% of the normal span.

No jointing is permitted in the crossing span.

The crossing shall be in accordance with approved designs and drawings of Railways.

UG Cable pipe structure should be at 5 mts away from Railway Power Support to be located by the Railway Authorities

Spun concrete pipe encasing cable under tracks should be laid at not less than 1 meter below

**5.7 Method of crossing**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl.No** | **Voltage** | **Category** | **Method of Crossing** |
| 1 | LT | A,B,C | Cable crossing |
| 2 | 11 KV | A,B,C | Cable crossing |
| 3. | 33 KV | A,B,C | Cable crossing or over head crossing as preferred by the owner (TSTRANSCO) |

**5.8 Minimum clearance between Railway track and overhead lines**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl.No** | **Voltage** | **Inside Station limits** | **Outside station limits** |
| 1 | LT | Only by cable crossing | Only by cable crossing |
| 2 | 11 KV | Only by cable crossing | Only by cable crossing |
| 3. | 33 KV | 15.3 Mts | 14.1 mts |
| 4. | 132 KV | 16.2 Mts | 14.6 mts |
| 5. | 220 KV | 17.1 mts | 15.4 mts |

**5.9 Insulators to be used**

|  |  |  |
| --- | --- | --- |
| S.No | Category | Type of Insulators |
| 1. | A,B | Double set of strain insulators strings shall be used in the crossing span in conjunction with a yoke plate wherever necessary. In each string one strain insulator shall be provided extra than the normal design of over head line. |
| 2. | C | Insulators as per normal design to be used. |

**5.10 River Crossing**

In the rivers on which the crossing is to be done, the data of highest flood level of atleast 20 previous years is to be obtained from the Revenue / Irrigation department.

Minimum clearance of 3 mtrs would be required for the conductors over the highest flood level.

Double pole, tripole or towers would be required to be specially designed, depending upon the span and conductor size for the river crossing.

Structures should be located at such places that they could be approached under flood condition also. The foundation of structure should be sound so that it may not get eroded or damaged due to rain water.

In case of navigable rivers, consultation with navigation authorities is necessary. The structures should be designed as to give sufficient clearance between lowest conductor and the highest flood level.

**6.0 Excavation of pits for poles and stays**

After receipt of approved, route map from the Engineer and after marking the pole locations with pegs, the Contractor has to commence the excavation work in accordance with the approved route map. The excavation is to be done by manual or mechanical tools. At locations where blasting is involved using explosives, prior approval of the Engineer is to be taken. Due to any special reasons if the permission is not given for blasting, it is the responsibility of the Contractor to use other methods and complete the excavation as per the specification.

The rate for excavation of pits for poles, stays quoted by the Contractor shall be the same for all types of soils including de-watering of pits, shoring, shuttering and blasting where ever necessary. No extra rate for dewatering, shoring, shuttering and blasting will be entertained.

The pits for the supports shall be excavated in the direction of the line, as this will facilitate the easy erection of supports, in addition to giving greater lateral stability. The pits are to be excavated to a size of 1.2 meters x 0.6 meters with its longer axis in the direction of line. Planting depth of pole over the base concrete shall be as mentioned below.

**Planting depth of poles**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Length of pole (Mts)** | **Planting depth in ground (Mts)** | **Exceptions** |
| 1 | 8.0 | 1.5 | In wet soil and black cotton soil depth may be increased by 0.2 to 0.3 m and wind span limited |
| 2 | 9.0 | 1.5 |
| 3 | 9.5 to 11.0 | 1.8 |
| 4 | 11.5 to 13.0 | 2.0 |

The excavation of stay pits shall be as per the “GUY ASSEMBLY” drawing enclosed to the specification (G6 to G12).

**6.1 Foundations**

Depending on type of soils, the sub soil water table and the presence of surface water five types of foundation designs will be used for locations classified in the following manner.

**6.1.1 Wet type**: To be used for locations

Where sub soil water is met at 1.8 meters or more below the ground level.

Which are in surface water for long period with water penetration not exceeding one meter below the ground level eg: paddy fields.

In black cotton soils

**6.1.2 Partially Submerged Type**

To be used at locations where sub soil water is met at more than 0.90 meters from the ground level.

**6.1.3 Fully Submerged Type**

To be used at locations where sub-soil water is met at less than 0.90 meters from the ground level.

**6.1.4 Rocky Type**

To be used at locations where hard rock is met with and where the bond strength between the rock and the concrete will be very high.

**6.1.5 Dry Type**

When the subsoil water is met at more than 1.8 meters below the ground level and only dry crops are raised and soils are normal dry cohesive or non cohesive.

The Contractor shall furnish a statement of type of foundations to be used for each location for approval by the Engineer. The factor of safety for foundations shall be at least 2.20.

**6.2 Base Concreting**

After the excavation of pole pits is completed, their alignment is to be checked once again. After satisfying with their alignment a pre cast R.C.C Base plate of size 450x450x75 mm (Drawing No G7) shall be put in the pit.

Alternatively cement concrete padding of 75 mm depth with 1:2:4 mix (M15 grade) may be laid, to increase the surface contact between the pole and the soil.

The leveling of Base plate / cement concrete padding shall be checked to ensure a level base for erection of the pole. The design details of the R.C.C Base plate are furnished in the enclosed drawing (G7). If cement concrete padding is provided, curing of concrete is to be done for a period of 14 days by covering the concrete with gunny bags.

**6.3 Pole Erection**

The Contractor should provide a method statement detailing the proposed method of erecting each size of pole for approval by the Engineer before erecting any poles.

**For the guidance of Engineer**

The general methods adopted for pole erection are mentioned below:

### Derrick Pole Method

The pole is laid out along the line route in such a way that the bottom of the pole is above the pit. For smooth sliding and perfect placement of pole in the pit an inclined trench to suit the pole width may be dug as shown in the sketch. A piece of MS Channel of size 100 x 50 mm may be placed in the inclined position at the end of the pit for enabling the pole to slip smoothly inside the pit.

The trench would facilitate pole to skid smoothly into the pit without jerks.

Derrick pole supported by a rope is erected vertically so that its leg is near the bottom of the pole. The pole is to be oriented so that strongest side takes the load during lifting.

Two side pulling ropes (Rope 1) are connected near the top of the pole so that the pole does not bend laterally during erection. Another rope (Rope 2) is tied at the top of the support and passes over the Derrick pole over a pulley and is pulled manually in the direction shown in the figure. A rope 3 is tied at the top of the pole and is pulled when the pole has risen about 45o from the ground level. To raise the support in position rope 2 is pulled and the pole slides down the pit on the channel. Finally rope 3 is also pulled till the pole stands vertical. Rope one is all the time kept tight. The pole is held vertical by means of ropes 1, 3 and 4. When the pole reaches the vertical position it is plumbed and adjusted if necessary by means of various ropes so that the pole comes in complete alignment and is in plumb. The pit is back filled in layers taking care to Ram the earth in one layer at a time. In loose soil special foundation may be necessary. Wherever necessary boulders may be used to give additional support to the poles.

It should be ensured that at the time of erection, four men are at the ropes and the superior should be at a distance for guiding correct position so that in the event of breaking of rope, if the pole falls, it will not result into an accident.

Erection procedure for double pole structures also is similar to the one described above except that 2 pits are made in the ground and two Derricks and two sets of ladders as necessary are required.

If required, cross arms and top cleats also may be fixed to the poles before they are erected. After the first rainy season inspection shall be made of the foundation and the pits shall be back filled with the earth and rammed well whenever the first filling is sunk due to the rains.

As the poles are being erected from one cut point to the next angle point the alignment of poles should be checked and set right by visual check. The verticalities of the pole should be check with spirit level. The facing of the pole in the transverse direction also shall be checked carefully, so that the cross arm will be exactly at right angle to the line direction. After the poles have been set in position pit is to be filled with earth / concrete as per the requirement and the temporary anchors and ropes are to be removed.

### Deadman’s Method

The pole is laid out along the line route. Channel is placed vertically at the back of the pit and the pole is moved forward till it rests against the channel. The pole is then raised manually and is supported on the dead man. The ropes are attached to the pole at a distance more than half the length of the pole from the butt. The pole is raised and the Deadman is moved forward until the pole spike or a ladder approximately three meters in height can be put in.

The ladder is used to take the first lift and Deadman is moved forward. The ladder is moved forward and another ladder approximately four meters in height or a pole-spike is put in. Deadman is now removed and the side guys are tightened to prevent the pole from swinging. Another ladder of approximately five meters height is introduced and lifts are taken alternatively with each ladder until the pole reaches an angle approximately 70o from the horizontal. The back and side guys are slackened. The front guy is tightened and the back guy is slak to the pole is pushed upto vertical position. The 5 meter ladder will be required only if the pole height is more than about 12 meters. The pole is then carefully plumbed with the help of guy rope and the butt of the pole is lined in with the poles already erected and the next to be erected. The pit is then filled in with the soil and rammed. Special boulders may be used to give additional support to the poles.

**7.Position of Pole**

All poles in the tangent / intermediate locations shall be positioned in the pit that the bigger section modulus of the pole is always transverse to the length of the line. At tension points the bigger section modulus of the pole shall be in the length of the line.

**8.Back Filling**

Back filling shall normally be done with excavated soil, unless it consists of large boulders / stones in which case the boulders shall be broken to a maximum size of 80mm. The back filling materials should be clean and free from organic or other foreign materials. The earth shall be deposited in maximum 200 mm layers, levelled and wetted and rammed properly before another layer is deposited.

**9.Erection of Double pole (D.P) Structure**

For 11 KV and 33 KV lines tension points are to be provided at angle points where the angle of deviation is more than 10 degrees. In straight runs tension points are to be provided at intervals of one Kilometer. Double Pole structures shall be provided at all tension points. The materials to be used and their sizes and measurements are shown in the enclosed drawings.

Double pole structure is to be erected in the bisection of the angle of deviation. The center to center spacing of the supports shall be 1500 mm. Double pole structures is to be erected as per the drawings enclosed to the specification (H9 for 11 KV and M6 for 33 KV)

The Contractor shall provide a method statement detailing the proposed method of erecting the DP structure for approval by the Engineer before erection.

After erection of the D.P Structures, earthing of these supports is to be done as per the specification and the poles are to be concreted with 1:3:6 ratio cement concrete using 20/38 mm granite metal.

**Locations to be concreted**

All angle locations to be concreted.

All tension locations to be concreted

All tapping poles to be concreted

Locations in the valleys where uplift is anticipated are to be concreted.

All fully submerged locations to be concreted

Alternate poles of partially submerged and wet locations to be concreted.

Every fourth dry location to be concreted.

The size of concrete shall be as mentioned below:

|  |  |  |
| --- | --- | --- |
| **S.No** | **Size of Support** | **Size of Concrete** |
| 1. | 8.0 Mts PSCC | 0.76 x 0.76 x 1.52 mts |
| 2. | 9.0 mts to 9.5 mts PSCC | 0.76 x 0.76 x 1.83 mts |
| 3. | 11.0 mts spun poles | 0.75 x 0.60 x 2.0 mts |

Curing of concrete is to be done for 14 days by covering the concrete with gunny bags and the balance portion of the pit shall be back filled with earth. The back filling shall be done as per the specification.

**10. Anchoring and Providing Guys for Supports**

Guys are to be provided to counter balance the load on the supports due to pulling of the conductors, so that the supports remain straight in vertical position without bending in any direction.

The guys shall be provided at the following locations.

Angle locations

Dead end locations

Tee off points

Steep gradient locations to avoid uplift on the poles

Two numbers storm guys to the central pole between two cut points perpendicular to the line direction.

The installation of stay will involve the following works:

Excavation of pit

Fixing of base plate to the stay rod and concreting and back filling of the pit.

Fastening guy wire to the support along with stay clamp and turn buckle, after fixing guy insulator(s) as per the drawing.

Tightening guy wire and fastening to the anchor.

The marking of the guy pit for excavation, the excavation of pits and setting of the anchor rod must be carefully carried out. The stay rod shall be placed in a position such that the angle of inclination of the rod with the vertical face of the pit is 45o.

The anchor plate shall be of size 450 x 450 x 75mm, made of RCC with 1:2:4 ratio and using 20mm machine crushed granite metal. Alternatively M.S.Plate of size 450 x 450 x 10mm may also be used. The pit shall be filled with 1:2:4 cement concrete using 20mm granite metal. The size of concrete block shall be 600x600x600mm at the bottom covering the anchor plate completely. The concrete shall be cured for 14 days and balance portion of the pit back filled with earth as per the specification 10.0.

Proper form of moulds adequately braced to retain proper shape shall be used. The moulds should be made water tight so that cement cream will not come out. After concreting to the required height the top surface should be finished smooth, with 1:6 slope towards the outer edge to drain off water.

In wet locations, submerged locations and marshy locations the site shall be completely dewatered during concreting and for 24 hours after completion. Moulds shall not be removed before a lapse of 24 hours after completion of concreting. After removal of form boxes, the concrete surfaces where ever required shall be plastered with a rich mix of cement and sand mortar in the shortest possible time.

After the curing time of concrete is over, the free end of the guy wire is passed through the eye of the anchor rod, bent back parallel to the main portion of the guy and bound after inserting the G.I.Thimble. The loop is protected by G.I.Thimble where it bears on the anchor rod. Where the existence of guy wire proves hazardous, it should be protected with suitable asbestos pipe of 50 mm dia and 2 mts length, filled with concrete, duly painted with black and white stripes with enamel paint of approved quality and make, so that it may be visible at night.

The Turn buckle shall be mounted at the pole end of the stay and guy wire so fixed that the eye bolt is half way in the working position, thus giving the maximum movement for tightening or loosening.

Guy insulators shall be provided to prevent the lower part of the guy from becoming electrically energized by contact with the upper part of the guy, when the conductor snaps and falls on them or due to leakage. No guy insulator shall be located at less than 3.5 mts (vertical distance) from the ground. The minimum distance along the stay between the point of contact with the pole and the top of stay insulator is 1.8 mts

Guy insulators shall comply with IS:5300.

Where stay angles of less than 45o are unavoidable the use of stay angles from 30o to 44o or bow guys or flying stays shall only be done with the approval of the Engineer. The anchoring and providing of guys for supports shall be done as per the drawing no G11.

Two numbers guy insulators are to be provided for 33 KV line.

The stay wires used for anchoring shall conform to IS:2141. The individual wire used to form “stranded stay wire” is to be of tensile grade 4 having minimum tensile strength of 700N /mm2.

11.1 The Sizes of stay wire used shall be as mentioned below:

|  |  |  |
| --- | --- | --- |
| **S.No** | **Size of Wire** | **Safe working load** |
| 1. | 7/2.5 or 7/12 | 920 kg |
| 2. | 7/3.15 or 7/10 | 1450 kg |
| 3. | 7/4.0 or 7/8 | 2340 kg |

**11.2 Stays for 55 mm2 AAAC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 11kv 55 mm2 AAAC3 Wire | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 1 | 7/8 | 1 | 7/10 |
| Single H13A | 20o | 3 | 7/8 | 3 | 7/10 |
| Single H13A | 30o | 3 | 7/8 | 3 | 7/10 |
| Double H13B | 40o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 50o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 60o | 5 | 7/10 | 5 | 7/10 |
| Four pole H14 | 70o | 4 | 7/8 | 4 | 7/10 |
| Four pole H14 | 80o | 4 | 7/8 | 4 | 7/10 |
| Four pole H14 | 90o | 4 | 7/8 | 4 | 7/10 |
| Double H15 | Dead End | 4 | 7/8 | 2 | 7/8 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11kv 55 mm2 AAAC 3 Wire + 30mm2 Earth Wire** | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 1 | 7/8 | 1 | 7/10 |
| Single H13A | 20o | 3 | 7/8 | 3 | 7/10 |
| Single H13A | 30o | 3 | 7/8 | 3 | 7/10 |
| Double H13B | 40o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 50o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 60o | 5 | 7/10 | 5 | 7/10 |
| Four pole H14 | 70o | 4 | 7/8 | 4 | 7/10 |
| Four pole H14 | 80o | 4 | 7/8 | 4 | 7/8 |
| Four pole H14 | 90o | 4 | 7/8 | 4 | 7/8 |
| Double H15 | Dead End | 4 | 7/8 | 2 | 7/8 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11 KV 55 mm2 AAAC 4 Wire** | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single L7/8/9/10 | 10o | 1 | 7/8 | 1 | 7/8 |
| Single L11 | 20o | 2 | 7/8 | 1 | 7/8 |
| Single L11 | 30o | 2 | 7/8 | 2 | 7/8 |
| Single L12 | 40o | 3 | 7/8 | 2 | 7/8 |
| Single L12 | 50o | 3 | 7/8 | 2 | 7/8 |
| Single L12 | 60o | 4 | 7/8 | 3 | 7/8 |
| Single L13 | 70o | 4 | 7/8 | 3 | 7/8 |
| Single L13 | 80o | 4 | 7/8 | 3 | 7/8 |
| Single L13 | 90o | 5 | 7/8 | 3 | 7/8 |
| Single L15/16/17 | Dead End | 4 | 7/8 | 2 | 7/8 |
| **11 KV 55 mm2 AAAC 5 Wire** | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single L7/8/9/10 | 10o | 2 | 7/8 | 1 | 7/8 |
| Single L11 | 20o | 2 | 7/8 | 2 | 7/8 |
| Single L11 | 30o | 3 | 7/8 | 2 | 7/8 |
| Single L12 | 40o | 3 | 7/8 | 2 | 7/8 |
| Single L12 | 50o | 4 | 7/8 | 3 | 7/8 |
| Single L12 | 60o | 4 | 7/8 | 3 | 7/8 |
| Single L13 | 70o | 5 | 7/8 | 4 | 7/8 |
| Single L13 | 80o | 5 | 7/8 | 4 | 7/8 |
| Single L13 | 90o | 6 | 7/8 | 4 | 7/8 |
| Single L15/16/17 | Dead End | 4 | 7/8 | 3 | 7/8 |

**11. 3 Stays for 100 mm2 AAAC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 11& 33 kv 100 mm2 AAAC3 Wire | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 1 | 7/8 | 1 | 7/8 |
| Double H13B | 20o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 30o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 40o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 50o | 5 | 7/8 | 5 | 7/10 |
| Double H13B | 60o | 5 | 7/8 | 5 | 7/10 |
| Four pole H14 | 70o | 8 | 7/8 | 4 | 7/8 |
| Four pole H14 | 80o | 8 | 7/8 | 4 | 7/8 |
| Four pole H14 | 90o | 8 | 7/8 | 4 | 7/8 |
| Double H15 | Dead End | 4 | 7/8 | 4 | 7/8 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11& 33 kv 100 mm2 AAAC 3 Wire + 55mm2 Earth Wire** | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 2 | 7/10 | 1 | 7/8 |
| Double H13B | 20o | 5 | 7/10 | 5 | 7/10 |
| Double H13B | 30o | 5 | 7/8 | 5 | 7/10 |
| Double H13B | 40o | 5 | 7/8 | 5 | 7/10 |
| Double H13B | 50o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 60o | 6 | 7/8 | 5 | 7/8 |
| Four pole H14 | 70o | 8 | 7/8 | 8 | 7/8 |
| Four pole H14 | 80o | 8 | 7/8 | 8 | 7/8 |
| Four pole H14 | 90o | 8 | 7/8 | 8 | 7/8 |
| Double H15 | Dead End | 6 | 7/8 | 4 | 7/8 |

**11.4 Stays for 148 mm2 AAAC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 11 & 33 kv 148 mm2 AAAC3 Wire | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 2 | 7/8 | 1 | 7/8 |
| Double H13B | 20o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 30o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 40o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 50o | 6 | 7/8 | 5 | 7/8 |
| Double H13B | 60o | 7 | 7/8 | 5 | 7/8 |
| Four pole H14 | 70o | 8 | 7/8 | 8 | 7/8 |
| Four pole H14 | 80o | 8 | 7/8 | 8 | 7/8 |
| Four pole H14 | 90o | 8 | 7/8 | 8 | 7/8 |
| Double H15 | Dead End | 6 | 7/8 | 6 | 7/8 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11 & 33 kv 148 mm2 AAAC 3 Wire + 55mm2 Earth Wire** | | | | | |
| Pole Type | **Angle of Deviation** | **30o Stay Angle** | | **45o Stay Angle** | |
|  |  | **No** | **Size** | **No** | **Size** |
| Single H6 | 10o | 2 | 7/8 | 2 | 7/8 |
| Double H13B | 20o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 30o | 5 | 7/8 | 5 | 7/8 |
| Double H13B | 40o | 6 | 7/8 | 5 | 7/8 |
| Double H13B | 50o | 7 | 7/8 | 5 | 7/8 |
| Double H13B | 60o | 8 | 7/8 | 6 | 7/8 |
| Four pole H14 | 70o | 8 | 7/8 | 8 | 7/8 |
| Four pole H14 | 80o | 12 | 7/8 | 8 | 7/8 |
| Four pole H14 | 90o | 12 | 7/8 | 8 | 7/8 |
| Double H15 | Dead End | 8 | 7/8 | 6 | 7/8 |

**12. The details of main components of guy assembly to be used are:**

1. **Anchor Plate**: R.C.C plate of size 450x450x75mm with M150 grade

2. **Anchor Rod** : 16 φ 1800mm length for 7/12 stay wire.

20 φ 1800mm length for 7/8 or 7/10 stay wire

3. **Eye Bolt** 20 φ 450 mm length with two Noshexogonel nuts

4. **Turn buckle** 16 φ rod for 7/12 stay wire

20 φ rod for 7/8 and 7/10 stay wires

|  |  |
| --- | --- |
| **Cross channel for turn buckle** | 75 x 40 channel or 65x65x6 angle for 7/12 stay wire  100 x 50 mm channel for 7/10 and 7/8 stay wires. |
|  |  |

The measurements of each component shall be as per the drawings enclosed.

**13.0 Fabrication of pole fittings:**

All the pole fittings are to be fabricated with the approved quality steel conforming to IS:2062 and IS:1852by using suitable machines for cutting, drilling, bending, welding and for grinding the sharp edges. The finished products shall appear neatly and elegantly to the satisfaction of Engineer in charge of works. Fabrication shall conform to clause 32 to 39 of IS : 800.

All M.S.Parts shall be hot dip galvanished conforming to IS:2629 and IS:4759

**13.1 Fixing of Cross-Arm and Top Clamp**

Type design of ‘V’ cross arms and tapping cross arms for 11 KV and 33 KV lines, ordinary cross arms for LT lines, top clamps (top fittings) for 11 KV and 33 KV lines along with the materials to be used are shown in the enclosed drawings. The steel materials used for manufacture of the pole fittings shall conform to the relevant I.S.Specifications. Fixing of ‘V’ cross arm and top cleat shall be in accordance with the spacing detailed in the drawings.

**13.2 Fixing to the support**

Fixing of cross arms and top cleats before the pole erection is also permissible. These are to be fixed to the support as shown in the drawings. Only G.I bolts and nuts and G.I Flatwashers and spring washers shall be used for fixing the pole fittings. The bolts and nuts and washers used shall conform to relevant I.S.Specifications. (IS : 67)

**13.3 Fixing of cross arms after pole erection**

For fixing the cross arms after the pole erection, by a skilled workman is also permissible. The Contractor shall provide a method statement detailing the proposed method for fixing to each size and type of pole for approval by the Engineer.

In this method extra care is to be taken to align the pole properly at the time of erection or else the erected pole has to be turned or twisted In back filled earth at a later date when the cross-arm is erected and this will weaken the foundation of the erected pole.

All the materials should be lifted or lowered through the handline and should not be dropped.

**13.4 Fixing of top cleat**

Top cleat for fixing to the support should be as per the drawings enclosed. It shall be hotdip galvanised neatly before fixing.

Additional stay clamp may be provided for better grip in addition to the two numbers through bolts & nuts. Only G.I Bolts & nuts and G.I.Washers shall be used for fixing the top cleat.

**13.5 Offset Arrangement**

Where it is not possible to maintain clearances to Buildings etc., line conductors shall be supported offset from the pole by means of a side arm and strut. In such cases ‘A’ type pedastals fabricated with 50x8 flat shall be used for fixing pin insulators. The rate quoted by the contractor shall include such contingent expenditure also and no extra claim will be entertained on this account. The ‘A’ type pedastal to be hotdip galvanished before fixing.

* 1. **Size of Flat for clamps**

|  |  |
| --- | --- |
| **Voltage** | **Size of Flat** |
| LT | 50 x 6 mm |
| 11 kV | 50 x 8 mm |
| 33 kV | 75 x 8 mm |

All clamps shall be of hot dip galvanised conforming to IS : 2629 & IS : 1852

**13.7 Special note to spun poles**

Where the cross arm is to be fixed to the spun (circular) pole, additional arrangement is to be made by the contractor to increase the contact area between support and cross arm. The Contractor shall deisgn and submit drawings for this additional arrangement for approval by the Engineer before erection. The cross arm along with this additional arrangement shall be hotdip galvanised before fixing.

The rates quoted by the contractor shall include this additional arrangement also.

**13.8 General**

A rubber packing of 3 to 4mm thickness is to be provided between back clamp and the support. The cross arm shall be perpendicular to the line direction and both ends shall be horizontal to the spirit level.

The contractor shall submit with his bid full specification the quality of zinc to be used stating its percentage purity and the process of galvanisation adopted by him.

**14. Fixing of Insulators**

The pins for insulators shall be fixed in the holes provided in the cross arm and the pole top brackets. The hexogonal nut provided to the pin shall be tightened fully. Spring washer shall necessarily be provided to the pins. The insulators shall be mounted in their places over the pins and tightened. Slacken the Pin and align the top groove of the insulator to the conductor direction – Retighten pin. Strain fittings are to be provided at all tension points. One strap of the strain fittings is placed over the cross arm before placing the bolts in the hole of the cross arms. The nut of the straps is so tightened that the strap can move freely in horizontal direction, as this is necessary to fix the strain insulator. The insulators shall be cleaned and examined for defects before fixing. Insulators with cracks or chips shall not be used. Disc insulators are to be used for 11 KV and 33 KV lines and shackle insulaors for LT lines at all tension points.

**15. Stringing of line conductors**

In conductor erection the main operations are:

Transport of conductor drums to work spot

Paving off the conductor

Jointing of conductors

Tensioning and sagging of conductors

Fixing of tension clamps, pin binding and jumpering.

**15.1 Transport of conducotr drums**

The conductor drums shall be transported to tension point by using motor vehicles. The conductor drums should never be dropped from the vehicles. They are to be unloaded with cranes or by using skids as in the case of loading. In handling transportation and unloading conductor drums shall be protected against injury / damage. If it becomes necessary to roll the drum on the ground for a small distance, it should be slowly rolled in the direction of the arrow marked on the drum.

**15.2 Paving off the conductor**

The paving off (reeling out) the conductors to be done by pulling the conductors from stationery reels. The reels (drums) are to be raised off the ground and fixed at one end of the tension point. The reels are to be supported in their carriages in such a way that they are free to rotate. The conductors are to be pulled out, there by rotating the reels and unwinding the conductors.

The conductor should never be paved out from a non rotating drum or coil as each turn removed gives the conductor a complete twist which may cause kinks or other damage. While unreeling, the conductor should not rub against any metallic fittings of the pole or ground. As the conductor is paved out it is passed through the gloved hands and examined for defects and damage by feel. When the defect is found, paving out is discontinued and the faulty section is either cut out or repaired.

While unreeling, the conductor is to be suspended in air in tension so that it will not touch the ground. The conductor should be passed over the poles on wooden or aluminium snatch pulley blocks provided with low friction bearings.

Each conductor drum is to be supported on a shaft which permits the reel to rotate while wire is being strung. Each reel shaft shall be provided with an external brake band which is adjusted to prevent over running when wire is being unreeled.

The work shall be so arranged by the contractor that before the end of the day the conductor shall be raised to a minimum height of 5 meters above the ground, by rough sagging

**15.3 Jointing of conductors**

After paving off the conductors, mid span jointing of conductors is to be carried out.

Care to be taken to see that there shall be no joint nearer than 20 mts distance to the support.

It is also to be ensured that there shall be no Joints in the Road Crossing or communication lines crossing spans.

The mid span jointing of conductors shall be carried out by using a Spring Loaded automatic splice for all AAAC Conductors.

The Contractor shall provide a method statement detailing the proposed method of Jointing for approval by the Engineer before Jointing, along with manufacturers specification.

Precautions to be followed while Jointing

Clean the conductor and sleeve thoroughly to remove the oxides, with a wire brush.

Apply conductor jointing grease to the portion of conductor to be inserted into the joint and repeat the wire brushing through the grease to remove any remaining surface oxide.

Measure and mark the conductor to determine how much must be inserted to reach the center of the splice.

Insert the conductor smoothly to the center stop, referring to the mark to assure complete insertion.

After both ends have been inserted, pull down on the splice to set the Jaws for permanent installation.

Ensure that, after Jointing the conductor and splice are in straight alignment.

**15.4 Tensioning and Sagging**

After paving off and jointing of conductors is completed tensioning operation should be commenced. The Contractor shall provide a method statement detailing the proposed method of tensioning and sagging for approval by the Engineer before commencing tensioning work.

Conductor to be pre-tensioned for two hoursat the 10o C sag; then increase sag to the rated temperature on that day.

**For the guidence of the Engineer**

**Procedure for tensioning and sagging**

First step is to connect one end of the conductor at one end of the tension point (Fixed end) firmly by fixing the tension insulators and tension metal parts as per the standards. Care should be taken kto see that sufficient conductor is left for jumpering. Temporary guys have to be provided for both the anchoring supports in the section. Aluminium tape to be wrapped over conductor at the tension metal parts for proper grip.

As the conductors are reeled out they are hoisted upto the cross arm. This may be done by means of a hand line. Since the cross arms are steel, the conductor should not be allowed to rest on the cross arm, since the conductor would get damaged when drawn over the cross arms during the unreeling and tightening process. Hence the conductors should always be hung in snatch blocks.

A snatch block is a single sheave block so arranged that it opens on as one side there by permitting the conductors to be inserted or removed. The snatch block also aids the conductor in taking a uniform tension through out its length when the conductor is pulled up.

When the conductors are hoisted in their place they are ready to be pulled up. To carry out this operation a come a long clamp is to be fastened to the other end of the line conductor.

The conductor may be pulled from the ground by using manilla rope for initial tensioning and tirfor or chain pulley block or any other pulling and lifting machine of sufficient safe working load for final tensioning. It is better, easier and faster to pull from the ground, since the chain block or tirfor can be operated more easily on the ground than on the pole.

Care should be taken in pullying up that splices and sleeves donot catch in the sleeves of snatch blocks. Any catch of this sort may prevent the conductor from coming up as it should .

At tensioning end, one of the conductors is to be pulled manually upto a certain point and then come a long clamp is fixed to the conductor to be tensioned. The grip of the come a long clamp is attached to the pull lift machine and gradually tensioned.

Immediately after pulling the tension is some what greater near the pulling end than it is at the fixed end. Hence the conductor should be pulled up to pretension (10o C) and allowed to settle for 2–3 hours, otherwise the sag will not be uniform. Also the conductors will be too tight near the pulling end and too loose near the fixed end. If they should be tied in this condition, it should place an unbalanced strian on the poles, cross arms, pin insulators, tie wires and conductors, which might lead to ultimate failure.

The initial stress of the conductor also has to be taken out in order to avoid the gradual increase in sag, due to setting down of the individual wire. This may be done by pulling up the conductor to a tension a little above the theoretical tension for the prevailing temperature and fixed up at that tension with a corresponding reduced sag. After certain time the conductor will settle down to the corect sag and tension. A tension of six to seven percent more than the theoretical value mentioned in the sag tables needs to be given.

Final tensioning and sagging shall be in accordance with the sag and tension chart of the particular conductor used.

It shall be ensured that

Maximum Tension at 0oC with maximum wind pressure and no ice loading not to exceed 50% of the ultimate strength.

Tension at 32.2oC (90oF) and still air not to exceed 25% of the ultimate strength.

The sag should be adjusted in middle span in short sections of line of about five to six spans and at two spans in other sections. Even when the sheaves are used it may be necessary to bounce the conductor at intermediate points with a handline in order to equalise the tension in the various spans. Soaping the conductor grooves at the supports so that the conductor will slide more freely may also be resorted to.

**Method of Measuring sag**

Sagging can be accomplished by sighting. In sighting for sag it is well to select a span near the middle of the length pulled up, which is of similar length to the basic / ruling span. Measurement is by use of targets placed on the poles below the cross arm. The targets may be light strip of wood clamped to the pole at a distance equal to the sag below the conductor when the conductor is placed in snatch block. The line man sees the sag from the next pole. The tension of the conductor is then reduced or increased until, the lowest part of the conductor in the span coincides with the lineman line of sight.

In lengthy sections more than six spans, sag shall be checked in two spans.

**15.5 Fixing of conductor to the support**

The Contractor shall provide a method statement detailing the proposed method of fixing the conductors to the support after tensioning to the desired sagging is done for the approval by the Engineer.

Traditional wrapped terminations may be used to terminate LT Conductors.

Three bolt Anchor clamps shall be used for termination of HT lines upto 80 Sq mm conductor size and four bolt Anchor clamps shall be used for 100 Sqmm and above sizes.

For the guidance of the Engineer normal procedure is mentioned below:

When sagging is completed, the tension clamps shall be fixed. The clamp can be fitted on the conductor without releasing the tension. A mark is made on the conductor with PVC steel grip tape at a distance from the cross arms equal to the length of complete strain insulator assembly. Before the insulator set is raised to position all nuts should be free. A come-a-long clamp is placed on the conductor beyond the conductor clamp and attached to the pulling unit. The conductor is pulled in sufficiently to allow the insulator assembly to be fitted to the clamp. After the conductor is clamped to the insulator assembly, the tension may be released gradually. If the tension is released with a jerk, an abnormal stress may be transferred to conductor and support, which may result in the failure of the cross arms, stay or pole in some cases.

After stringing is completed, all poles, cross arms, insulators, fittings conductor joints etc are to be checked up to ensure that there have been no deformities etc.

The temporary guys provided at the anchoring supports may be removed .

The excess conductor is to be cut by leaving sufficient length for jumpering. The ends of the conductor shall be taped properly before cutting.

Once again it shall be checked and ensured that sag is uniform through out the length and sufficient ground clerances are maintained as per IE rules.

**15.6 Tying of conductor on pin insulators**

Helically formed ties conforming to IS : 12048 – 1987 shall be used for securing the conductor on Pin insulator. These ties shall be of a material compatable with the conductor material and dimentions suitable for conductor size.

**Elastomer** tie pad for insulator shall be used with the formed ties to avoid abrasion of the conductor and to prevent conductor coming into direct contact with the insulator.

The Contractor shall provide a method statement detailing the method of pin binding for approval by the Engineer, along with manufacturers specifications.

Precautions

Helical formed ties are precision devices which should be handled carefully to prevent distortion or damage.

Ties should be stored in cartons under cover preferably shelf storage – until used.

1. Helical formed ties should be used.

2. Ensure that correct size tie is used.

3. The lay direction of the tie must be the same as that of the outer layer of the conductor to which it is applied.

## Procedure

The Contractor must use correct size helical formed ties manufactured for the conductor being used (100 mm ties can only be used on 100 mm conductor – they are not range taking). The Elastomer tie pad is placed around the conductor when it rests on the insulator with the slit upper most, there by preventing the contact between the conductor and the insulator. The Contractor should not use undue force or have to bend the ties to make them fit – if he does it is the wrong tie or he is installing it incorrectly. Note also that on small angle the conductor sits on the side of the insulator, than a special side tie has to be used which is different in design from the top tie used in in-line poles when helical formed ties are used there is no need to reinforce the conductor, as is common practice with hand bound ties.

**For guidance of Engineer the normal procedure for hand bound ties (without formed ties ) is mentioned below:**

After the conductor is fixed at the tension points, the next step is to place the conductor on the top of the pin insulators, from the snatch blocks and removing the snatch blocks. This can be done by one person sitting on the cross arm. If it is felt necessary a hand line may be used for this purpose. For placing the conductor in position the pin insulators are provided with top groove and also side groove.

In straight runs of line, the conductos are placed on the top groove of the insulators. When there is a small angle of deviation upto 10o the conductor is placed on the side groove. The conductor shall occupy such a position on the insulator as will produce minimum strain on the tie wire.

Before tying the conductor to the insulators two layers of aluminium tape should be wrapped over the conductor in the portion where it touches the insulator. The width and thickness of aluminium tape to be used shall be as specified in the hand books of aluminium conductor manufacturers. For 11 KV and 33KV lines main conductor to be reinforced with another conductor piece of 500 mm length and same size and quality as that of main conductor, bent upwards at right angles at both ends to a height of 50mm. The ends of the stiffner piece to be wrapped with aluminium tape or provided with binding.

# Rules of tying

Only fully annealed tie wire to be used.

SWG No 6 sizeof aluminium tie wire shall be used.

Sufficient length of tie wire for making the complete tie including an end allowance for gripping with the hands shall be used. Normally the wire length varies from one meter for LT lines to 4 meters in 33 KV lines. The extra length should be cut at each end after the tie is completed. The binding shall be for 400mm length on stiffner piece and 30mm on either end of the stiffner piece.

Tie should provide a secure binding between line conductor, insulator and stiffner piece.

There shall be positive contacts between the line wire and the tie wire so as to avoid any chafing contacts.

Use of pliers shall be avoided

Nicking the line conductor shall be for bidden.

Tie wire which has been previously used shall not be used

Harddrawn or AAAC wires or fire burned wires shall not be used, since they are either partially annealed or injured by over heating.

## Steps for making tie

Bend tie wire around the insulator above conductor to form ‘U’

Holding the tie wire tightly against insulator throw two tight close wraps around the conductor on each side of insulator keeping these wraps snugly against the conductor

Cross the legs of the tie wire around the insulator, right to left and left to right.

With both legs of the wire crosses tightly wrap each leg around the conductor upto the end of sliffner piece.

**15.7Jumpering**

After the stringing is completed jumpering shall be given at the tension points with the same line conductor by using P.G.Clamps. Two numbers double bolted P.G.Clamps shall be provided for each jumper. Under no circumstances P.G.Clamps or binding, to the main line conductors shall be permitted while providing jumpering except at Tee-off poles, where jumpers are to be given on the main conductor. Hence the contractor shall take all required precautions to leave sufficient conductor at each tension point for jumpering purpose.

While making jumpers chromite or graphite conducting, oxide inhibiting grease should be applied in the P.G.Clamps and also to the conductor where jointing takes place. Then the P.G.Clamps and conductor shall be cleaned with wire brush.The wire brushing should be done through the Conductor grease to rpevent oxide instantly reforming.

The material used for P.G Clamps should be aluminium alloy and the bolts must be galvanised.

The rate quoted by the contractor shall include all the above items including fittings and necessary accessories.

15.8 Do’s and Don’t’s

For the guidance certain DO’S and DON’TS are given below while stringing the conductor.

Do’s

Use proper equipment for binding aluminum conductors at all times.

Use skids or similar method for lowering conductor drums from

transport.

Examine reel before unreeling for presence of nails or any other object which might damage conductor.

Rotate the reel while unwinding the conductor in the direction marked on the reel.

Grip all strands while pulling out the conductor.

Control the unreeling speed with a suitable braking arrangement.

Use wooden rods for suitable braking arrangement.

Use long straight, parallel jaw grip with suitable liners when pulling conductor, thus

avoiding nicking or kinking of the conductor.

Use free running sleeves or blocks with adequate grooves for drawing / paving

conductors.

Use proper sag charts.

Mark conductors with adhesive tape which will not damage the strands.

Make all splicing with proper tools

Chromite or graphite conducting oxide inhibiting grease, should be applied before cleaning with wire brush, where ever jointing takes place.

Don’ts

Do not handle conductor without proper tools at any stage.

Do not pull conductors without ensuring that there are no obstructions on the ground.

Do not pull out excess quantity of conductor than is required.

Do not make jumper connections on dirty or weathered conductor, clean the conductor using wire brush.

Do not handle aluminum conductor in a rough fashion but handle it with a care it deserves.

**15.9** Tapping spans from Substation

**16**. The following precautions shall be taken while erecting (stringing) 33 KV and 11 KV Over head lines from the substation structures.

**16.1 Maximum Tension**

Maximum tension in each line conductor strung from substation structure is

450 Kg.

**16.2 Maximum Span**

Maximum permissible first span from the substation structure in 60 mts

**16.3 Uplift on Adjacent spans**

Maximum slope (mean of three conductors) at the point of attachment in 1:8 above horizontal.

**16.4 Earthing**

Earthing shall be provided by the contractor in accordance with the requirements of Indian Electricity Act 2003 and in particular as mentioned below.

All metallic supports shall be provided with earthing as per drawing G3

For PSCC / RCC poles, the metal cross arms and insulator pins shall be bonded and earthed at every pole with earthing as per drawing G3.

All special supports on which AB Switches etc are mounted shall be provided with pipe earth as per drawing G4.

Supports on either side of the road, railway track or river crossing shall be provided with pipe earthing as per G4.

At all tension points at double pole locations the steel and metal parts are to be provided with pipe earthing as per G4.

All AB Switch handles to be earthed with pipe earth plus operators earth mat as per G4.

**16.5 Bentonite** shall be used as shown in the drawing Nos G3 and G4. Charcoal and salt shall not be used under any circumstances.

The earth resistance shall be less than 20 ohms

The earthing shall be as per the drawings enclosed to the specification (Drawing No G3 & G4)

**16.6 Works relating to road crossings**

Guardings shall be erected at all road crossing locations, communication lines crossings as per the standards and as per the drawings enclosed to the specification. All these guardings are to be provided with pipe earthing. These guardings shall comply with I.E Rules 1956 maintaining minimum required clearances as mentioned in Clause 5.0 of the specification.

**16.7** For crossing any railway track, Indian Electricity Rules and the regulations of railway authorities are to be followed.

**16.8** Works such as erection of support underneath an existing power line and paying out of conductor and earth wire and stringing the power line crossing span or a railway crossing span or road crossing span will have to be done only after receipt of the line clear from TGSPDCL authorities and approval from the concerned departmental officers. Such special works, some times may not match with the programme of the contractor. In such cases, the Contractor shall execute such works as and when approvals are received.

The rates quoted by the Contractor shall take into consideration such contingencies also.

**17.0 Concreting**

17.1 The cement concrete used for the foundations shall be of 1:3:6 Grade or as per the schedule of quantities.

The sand used for the concrete shall be composed of hard silicon materials and well sieved. It shall be clear and of a sharp angular grit type and free from earthy or organic matter and deleterious salts.

The aggregate shall be of clean broken hard granite approved by the Engineer. It shall be hard, close grained quality. It shall also be as far as possible cube like, preferably angular, but not flaky, perfectly clean and free from earth, organic or other deleterious matter. 20mm aggregate shall be used for base concreting and 38 mm aggregate for pole concreting.

The water used for mixing concrete shall be fresh and conform to I.S.Specifications and it should be clean and free from oil, acids and alkali. Saltish or brackish water should not be used.

The concrete should be mixed as stiff as the requirement of placing the concrete in the form of moulds and the degree to which the concrete resists segregation will permit. Hence, the quantity of water ascertained by the slump test only shall be used. Curing shall be done as per standards for a minimum period of 14 days.

Proper forms of moulds adequately braced to retain proper shape while concreting should be used. The mould should be made water tight so that cement cream will not come out leaving only sand and jelly consequently forming honey-combing in the concrete.

The rate for concrete should be inclusive of form box. Sufficient number of form boxes for each type of foundation should be made so that the works are not held up on this account.

After concreting to the required height, the top surface should be finished smooth, with slight slope towards the outer edge to drain off the rain water falling on the concrete.

In wet locations, the site must be kept completely de-watered both during the placing the concrete and for 24 hours after completion. There should be no disturbances of the concrete by water during this period. No extra rate will be paid for the de-watering and the rate for concrete shall be inclusive of dewatering charges.

The forms of moulds shall not be removed before a lapse of about 24 hours after the completion of concreting. After removal of the form moulds, the concreted surfaces, wherever required, shall be repaired with a rich cement and sand mortor in the shortest possible time.

Concreting to be done at locations as per Item no 11 of specifications to the sizes as mentioned below.

**Size of concrete**

|  |  |  |
| --- | --- | --- |
|  | **Size of Support** | **Concrete Size** |
| 1. | 8.0 Mts PSCC | 0.76 x 0.76 x 1.52 mts |
| 2. | 9.0 mts to 9.5 mts PSCC | 0.76 x 0.76 x 1.83 mts |
| 3. | 11.0 mts spun poles | 0.75 x 0.60 x 2.0 mts |
| 4 | Stay concrete | 0.45 x 0.45 x 1.265 mts |

For any other supports concreting shall be done as per the directions of field Engineer.

If auger is used for excavation of pole pits only base concreting shall be done and there is no need for mass concreting, provided the ground conditions are firm. Augering not suitable for running sand / Marshys soils

**18. Miscellaneous Items**

Location numbers for each pole shall be painted on the pole with black enamel paint on white enamel paint base. Two coats of paint to be provided. Alternatively renumbered metallic plates may be punched on to the supports at a height of 1.5 mts from ground level.

Pole schedules are to be prepared by the Contractor with proforma mentioned in clause 23 of specification and hand it over to the Engineer. All approach roads available and power lines crossing locations shall be marked in the drawings.

Ant climbing devices and enamel danger boards are to be provided at all railway crossings, road crossings and double pole structures. No extra charges shall be admissible even though separate gangs may have to be sent by the Contractor for fitting these accessories and attachments on the support at the appropriate time. Only G.I materials shall be used.

1. **Workman ship**

The Contractor shall entirely be responsible for the correct erection of line as per specification / approved drawings and their correct setting and alignment, as approved by the Engineer. If the supports and D.P.Structures after the erection are found to differ from approved route maps and drawings or to be out of alignment, the Contractor shall dismantle and reerect them correctly at his own cost without extension of time. The supports must be truly vertical and in plumb after erection and no straining will be permitted to bring them to vertical position. Verticality of each support shall be checked by the Contractor and furnished to the Engineer.

Maximum permissible tolerance is **50** mm in respect of verticality.

**20. Final checking, testing and commissioning**

After the completion of the works final patrolling and checking of the line shall be done by the Contractor to ensure that all the foundations works, pole erection and stringing has been done as approved by the Engineer and also to ensure that they are complete in all respects. All works shall be thoroughly inspected keeping in view of the following main points.

Sufficient back filled earth is lying over each foundation pit and it is adequately compacted.

Concreting of poles is in good and finally shaped condition.

All the accessories and insulators are strictly as per the drawing and are free from any defects or damages, whatsoever.

All the bolts and nuts and pole fittings are galvanized and as per contractual provisions.

The stringing of the conductors has been done as per the approved sag and clearances as per IE rules are available.

No damage, minor or major to the conductor, earth wire, accessories and insulators strings, still unattended are noticed.

At all tension points, jumpers are provided to each phase with two Nonaluminum alloy PG clamps.

Any additional tests as required by the Engineer to prove that the works are as per the specification are to be carried out by the Contractor at no extra cost.

The Contractor shall submit a report to the above effect to the Engineer. In case it is noticed later that some or any of the above are not fulfilled, the Engineer has option to get such items rectified through other agencies and recover the cost of such works from the bills payable to the Contractor against that contract or any other contract executed by him for the TSTRANSCO.

In addition to the above, the contractor shall be responsible for testing and ensuring that the total and relative sags of the conductors are within the specified tolerance. Such tests shall be carried out at selected points along the route as required by the Engineer and the contractor shall provide all necessary equipment and labour to enable the tests to be carried out.

Should any pole found to be leaning at a later date with in 12 months from the date of handing over, the Contractor shall rectify the same without any extra cost.

Should any cross arm, top cleat or insulator found to be out of alignment / leaning at a later date with in 12 months from the date of handing over, the contractor shall rectify the same without any extra cost.

The Engineer reserves the right to demand replacement of poles, clamps etc., for rectification of such defects.

The TGSPDCL staff must make a final check of the complete line, after the contractor confirms that he has carried out all the checks required for energizing the line. The Engineer shall take full responsibility of checking the Contractor’s work as per the specification and furnish a certificate to that effect.

After satisfactory tests on the line and approval by the Engineer the line shall be energised at full operating voltage before handing over.

**21.0 POLE SCHEDULES**

The contractor shall hand over the pole schedules in the following formats

* 1. **33 KV Line Pole Schedules**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sl.  No | Loc. No | Type of support | Height (Mts) | SP/DP/4P | Struct pole | Type / HT | Span length | Ground clearance | Size of conductor | ‘V’ cross arm |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

**33 KV Line Pole Schedules**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Top cleat | Horizontal ‘x’ arm | Strut for X-arm | Pedastal clamps | Pins with insulators | Discs | Metal parts | Bracing sets | Back clamps | Stay clamps | Guy insulators (No) |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |

**33KV line Pole Schedules**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stay wire size | Coil earth | Pipe earth | Pole concrete full/sleeve/nil | Danger boards | Anti climbing devices | Bolts & nuts (No) | P.G.Clamp | Conductor joints | Road crossing (Specify road name) | River / canal crossing (specify name) |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |

**21.2 11 KV line Pole Schedules**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Loc.  No | Type of support | Span length | Size of conductors HT | No of LT conductors LT | Size of LT conductor | Ground clearance | Clearance between HT&LT | ‘V’ cross arm | Top cleat | LT 3 φcross arm (Type) | LT Sφ x-arm (Type) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Horizontal X-arm | Strut for X-arm | 11 KV pins with insulators | 11 KV discs | 11 KV metal parts | LT pins with insulators | Bolts & nuts (No) | L.T shackles | C.I.Knobs | L.T.Straps | Back clamps | Stay clamps | Strut pole |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stay sets | Stay wire size | Guy insulators No | Pipe earth | Coil earth | ‘A’type pedestals | Top channels for spl structures | Bracing sets for DPS | Pole concrete full/sleeve/nil | P.G.Clamps | Conductor joints | Danger boards | Anticlimbing devices | Guardings | Road crossing (Name) | Canal crossing (Name) |
| 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |

**21.3 POLE SCHEDULE FOR CABLE CROSSINGS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S. No | Loc.  No | Voltage | Type of support | Span | Size of cable | Length of cable | Angle of crossing | End of terminal | | Pipe earth | LAS | Size and length of G.T.Pipe used | Stays | Strut | Size of stay wire | Back clamps | Cable below ground level | Loop length provided |
|  |  |  |  |  |  |  |  | No | Details |  |  |  |  |  |  |  |  |  |

**Guarding Details**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sl.  No | Loc | Voltage | Type of support | Height of support | Span length | Distance between guard wire & ground | Distance between guard wire & phase conductors | Phase conductos& earth | Between guard wire &telcomm wire | Size of guard wire | Size of lacings | No of guard wires | No of lacings | Length of guarding X-arm | Earth resistance | Angle of crossing |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**22.A Recommended Pre-Stressed Cement Concrete (PSCC) poles**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Dimensions | | | |  |
| Length  M | SWL  kg | Type | Base  Mm | | Top  mm | | No of steel wires |
|  |  |  |  |  |  |  |  |
| 8m | 200 | Solid | 290 | 90 | 145 | 90 | 12 |
| 8m | 300 | Solid | 380 | 100 | 145 | 100 | 12 |
|  |  |  |  |  |  |  |  |
| 9m | 200 | Solid | 315 | 105 | 115 | 105 | 12 |
| 9m | 300 | Solid | 355 | 105 | 185 | 105 | 16 |
| 9m | 400 | Solid | 395 | 105 | 225 | 105 | 20 |
|  |  |  |  |  |  |  |  |
| 9.1m | 280 | ‘I section’ | 350 | 150 | 130 | 150 | 16 |
|  |  |  |  |  |  |  |  |
| 11m | 500 | Spun concrete | 393 |  | 228 |  | 11 |

9.1m/280 kg or 500kg spun concrete poles are to be used at all angle, section and terminal poles to withstand compression loads due to stays and side winds.

GUIDELINES FOR OBTAINING FOREST CLEARANCE

**Forest Clearance**

In accordance with the provisions contained in the Forest (Conservation) Act 1980, it is unlawful to start the work of laying lines in the forest area with out the approval of forest department.

Hence the proposal for obtaining permission should be initiated sufficiently in advance, i.e., atleast six months, so that permission from forest department is available at the time of taking up the work.

In case of sub transmission and distribution lines, the line should be proposed along fire protection lines, forest Roads, PWD Roads. If it is not possible, then possibility of laying the line through thin forest should be explored. As a last chance, the line should be proposed through dense-forest.

**23. Prior Permission from forest department**

For the purpose of obtaining prior permission the lines have been divided into three categories.

**Category I** : The lines passing along the fire protection lines, forest roads and PWD Roads. In this case no tree shall be cut. Only chopping of tree branches upto 1.5 mts on either side of the line is permissible. The permission in respect of these cases will be accorded by the Additional Chief Conservator of Forest.

**Category II**: The cases in which nominal tree cutting is involved. The permission in respect of this category will be accorded by the SECRETARY (Forest) Government of the state (Govt of T.G) on the recommendations of Additional Chief Conservator of Forest.

**Category III** : Lines passing through dense forest, involving extensive tree cutting shall come in this category. Under this category the cases processed by the forest department shall be referred to the Government of India for according permission.

**Procedure for obtaining forest Route Clearance in respect of Category I and II.**

Prior permission to survey the proposed line is to be obtained from the forest department by addressing a letter as mentioned below.

**T&P TO BE SUPPLIED BY THE CONTRACTOR**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Description** | **Qty.** |
|
| 1 | Chain Pulley 3 T | 1 No. |
| 2 | Ladder 20` (Al) | 1 No. |
| 3 | Test Lamp, Rechargable torch light | 1 No. each |
| 4 | Clamp meter (MECO) | 1 No. |
| 5 | Meggar 2000 Ohms ( 0-2.5 KV) | 1 No. |
| 6 | Rain Coats, Gumboots | 2 Nos. each |
| 7 | Line Earthing Rods | 2 Sets |
| 8 | Tool Box (20 x 10 x 15), DE Spanners set (No. 6 to 20),  Ring spanners set (No. 6 to 20) | 1 No. each |

**23.1 General:**

The erection of structure and equipments, cable laying and earthing has to be done by the contractor using his own T & P, a list of materials / equipment that will be required for erection are to be procured by the contractor.

**23.2 SAFETY:** The contractor shall provide and make all necessary arrangements for the safety of the staff and laborers, at site of work. The TGSPDCL will not in any way be responsible for any accident, minor or fatal to any person at the site of works or for any damages arising there from during erection and this shall be the contractor’s responsibility. The staff insurance charges, if any, shall be borne by the contractor himself.

**23.3 ERECTION OF STRUCTURES:** The structures shall be erected by piecemeal method on the foundation, after allowing the required curing time for the foundations. The members shall not be strained or bent during the course of erection. Care shall be taken to see that the jointing surfaces are clean and free from dirt or grit and fit properly. The structures shall be erected strictly in accordance with the approved drawings.

The bolts and nuts, spring washers and pack washers required for the work will be supplied by the contractor.

After erection of structures the bolts shall be checked to ascertain that all nuts are fully tight. The contractor shall ensure that all the bolts are in position and fully tightened.

The structure must be truly vertical after erection and no straining will be permitted to bring them to vertical position.

**24. FINAL CHECKING, TESTING AND COMMISSIONING**

**24.1 FINAL CHECKING :** After completing the works, the contractor shall ensure that following points are not missed :

1. Backfilling is completely done and compacted along with leveling.
2. Coping / Muffing / Plinth surfaces are done to proper shape.
3. Bolts of the structures are properly tightened.
4. Cables are properly dressed.
5. Equipment such as breakers, isolators are properly operation.

**24.2 TESTING :** The contractor shall give necessary assistance to the TGSPDCL Engineers at the time of testing the equipment by providing required labour and testing equipment at the test location. Any defects found during testing shall be rectified by the contractor forthwith. Without any charges to the Board.

**24.3 COMMISSIONING:** All the tests shall be completed by the contractor successfully before commissioning of Sub-Station.

**25. RECTIFICATION OF DEFECTS DURING THE DEFECTS LIABILITY PERIOD:**

The defects liability period of the Sub-Station is 12 months from the day of commissioning and acceptance by the TGSPDCL. Defects if any, noticed during the above period shall be rectified by the contractor free of cost of the Board on hearing from the TGSPDCL.

Note: The Contractor has to follow REC standard for the work where ever it is not specifically mentioned above.

# TECHNICAL SPECIFICATION FOR 33 KV, 11 KV AND LT INTERCONNECTING UNDERGROUND CABLES

**GENERAL STANDARDS AND CODES:**

Electricity Rules, 1956

Indian Electricity Act 1910

Indian Electricity (Supply) Act 1948

Electricity Act, 2003.

Indian Factories Act

IEC-540 Test methods for insulation and sheaths of electric cablesand cords.

IEC 60 High Voltage Test Techniques.

IS-1255 (1991) Code of practice for installation and maintenance of powercables, upto and including 33 kV rating

IEC-287 (P1 to P31995)Calculation of the continuous current rating of cables(100% load factor).

IS-5216 Guide for safety procedures and practices in electricalworks.

IS-5, 1994 Colors for Ready Mixed Paints and Enamels

IS-617, 1991 Aluminum and Aluminum Alloy Ingots and Castings forGeneral Engineering Purposes

IS-2071 (P1 to P3) Methods of High Voltage Testing.

IS-3043(Reaffirmed 1991)Code of Practice for Earthling

IS 10810 Methods of testing cables.

IEC 66 Environmental Test

IEC-117 Graphical Symbols

Materials shall conform in all respects to the relevant Indian Standard Specifications with Latest amendments there to

Title IS. No.

1. Code of practice for installation and maintenance of transformers IS-10028

2. Cement IS269

3. Erection of over head lines IE Rules 1956

4. Earthling REC Standards

5. Steel IS6003/1970

6. Fasteners IS6639/1972

7. Galvanizing IS2629,IS4759

8. Aggregate IS383

9. Concrete Mix IS1343

10. RCC IS456

11 Cable Jointing IS1255

12 LT PVC Sheathed aluminum cable IS694

Materials conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. In case the bidders who wish to offer materials conforming to other standards, salient points of difference between standards adopted and specific standards shall be clearly brought out in the schedule. 4 Copies of such standards with authentic English translations shall be furnished along with the offer.

**1.12 MATERIAL/ WORKMANSHIP**

1.12.1 General Technical Requirement

1.12.1.1 Where the specification does not contain references to workman ship,  
equipment, materials and components of the covered equipment, it isthat the

same must be new, of highest grade, of the best quality of their kind, proper

strength conforming to best engineering practice and suitable for the purpose

for which they are intended.

1.12.1.2 When required by the specification or when required by the Employer the Bidder

shall submit, for approval, all the information concerning the materials or

components to be used in manufacture. Machinery, equipment, materials and

components supplied, installed or usedwithout such approval shall run the risk

of subsequent rejection, it being understood that the cost as well as the time

delay associated with the rejection shall be borne by the contractor.

1.12.1.3 The design of the Works shall be such that installation, future expansions,

replacements and general maintenance may be undertaken with a minimum of

time and expenses.

In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the employer’s engineer.

1.12.1.4 All materials and equipment shall be installed in strict accordance with the

manufacturer’s recommendation(s) and relevant IS codes of practices. Only first-

class work in accordance with the best modern practices will be accepted.

Installation shall be considered as being the erection of equipment at its

permanent location. This, unless otherwise specified, shall include unpacking,

cleaning and lifting and placing into position, grouting, leveling, aligning,

welding, coupling of or bolting down to previously installed equipment

bases/foundations, performing the alignment check and final adjustment prior to

initial operation, testing and commissioning in accordance with the

smanufacturer’s tolerances, instructions and the Specification.

**1.13 Information and data.**

a) The Information furnished is the best available, however the Employer does not guarantee the correctness of interpretations, deductions or conclusions which are given supplementary information in the Bid Documents or in any reports, maps drawings, diagrams or in other reference information available to the bidder from the Employer or otherwise.

The information has been produced as found, communicated to, ascertained or otherwise learned by the Employer.

b) It will be the Bidder’s responsibility to satisfy himself from the “Reference Information” supplied and or inspection of the site that sufficient quantities of construction materials required for the works shall exist in the designated borrow areas or quarry sites.

The Employer does not accept any responsibility either in handling over the quarries or procuring the materials or any other facilities. The tenderer will not be entitled for any extra rate or claim for the misjudgment on his part for the quantity of materials available in the quarries.

c) The contractor shall make his own enquiries regarding the availability of other

materials and make his own arrangements for procuring them.

d) Climatic conditions.

The Climatic conditions prevailing in the area are as per the details given below.

i) Location : In the state of Telangana.

ii) Max.ambient air temp.(deg.C) : 50

iii) Min ambient air temp (deg C) : 7.5

iv) Average daily ambient temp.(deg.C) : 35

v) Relative humidity % : 100

vi) Average annual rainfall (mm) : 925

vii) Max altitude above mean sea level (meters) : 1000

viii) Max wind pressure (Kg/Sq.mm) : 200

ix) Isoceramic level (days / year) : 50

x) Seismic level (Horizontal accelerations) : 0.10 q.

**Note**: Moderately hot and humid tropical climate is conducive to rust and fungus growth. The climatic conditions are also prone to wide variations in ambient conditions. Smoke is also present in atmosphere. Heavy lightning also occurs during June to October.

**1.14 Approaches:** The approaches to the site of work, if necessary will have to be formed by the contractor at his own cost and will be an access both for personnel and equipment.

**1.15 Water and power:** The contractor has to make use of Water Supply available if any at the substation site for construction purpose.. Transport of water from the source to the working area will be contractor’s responsibility .It is essential that the contractor shall prevent misuse and wastage of water at all times failing with necessary charges will be collected from the contractor. In case, water is not available at site, the contractor has to make his own arrangements and any extra claim on this will not be entertained. Power required for construction will be made available at one point on chargeable basis. The power shall be used exclusively for substation works only.

**1.16 Supervisor, Skilled and Unskilledlabour:** The Contractor shall provide experienced technically qualified supervising engineers for supervision. The contractor shall engage only competent skilled workers.

**1.17 Site Stores:** The contractor shall establish temporary stores at his own cost at the Substation site for storing cement and equipment. The stores should be dismantled and site cleared after the work is completed.

**1.18 Construction Materials:**

1.18.1Cement:

a) The Contractor has to make his own arrangements for the procurement of cement of

required specifications required for the works and shall make his own arrangements for

adequate storage of cement.

b) The contractor shall procure cement in standard packing eg. 50 kg bag or drums.

c) The Contractor shall forthwith promptly remove from the works area any cement that the Engineer may disallow for use.

d) The contractor shall further, at all times satisfy the engineer on demand by production of records and books or by submission of returns and other proofs as directed. The cement being used is tested and approved by Engineer for the purpose and the contractor shall at all times keep his records up to date to enable the engineer to apply such checks as he may desire.

e) Cement which has been unduly long in storage with the contractor or alternatively has

deteriorated due to inadequate storage and thus become unfit for use in the works will be

rejected by the employer and no claim will be entertained. The contractor shall forthwith

remove from the work area. Any cement the Engineer may disallow for use on work and

replace it by cement complying with the relevant Indian Standards.

1.18.2 Steel:

M.S.Channel, MS.Angle MS Flat and MS rod required for fabrication of Cross – arms, top cleats clamps etc. have to be procured by the contractor. Fabrication of materials is to be arranged including one coat of red oxide and two coats of Aluminum paint.

**2**. **RMU’S**

RMU’s shall be installed as per the specified code of practice and the manufacturer’s

instructions. The RMU’s shall be installed on concrete plinth. Care shall be taken in

handling instruments, relays etc. Any damage to relays and instruments shall be

immediately reported to the Engineer. It should be earthed by two separate and direct

earth connections through two separate earth electrodes.

2.1 Fabrication of structures: Straightening, cutting, assembly, bolting and welding shall be as per IS 800  
2.2 Bolts and nuts: Nominal nut size Proof stress (N/sq.mm)

M 16 490

M 20 500

The bolts and nuts shall be hot dip galvanized as per IS-1367

2.3 Spring washers shall be of type B and shall conform to IS-3063. The spring washers shall be made from high quality spring steel conforming to IS-4072. The spring washers shall be electro galvanized with a coating thickness of 25 microns.

2.4 Galvanizing: All members of structures “U” bolts etc shall be hot dip galvanized.

Galvanization shall be done by hot dip process and metal modules and there shall be no

clogging of bolts holes due to the stay of zinc in the holes.

2.5 Marking: Each part of steel structure shall be clearly stamped with 20mm steel stamping die with the identification number mark or symbol to facilitate erection.

2.6 The structures shall be erected by piece-metal method on the foundations after allowing the required curing time for the foundations. After erection of the structures, the bolts shall be checked to ascertain that all nuts are fully tight. The contractor shall ensure that none of the bolts are left out. The structure shall be truly vertically after erection and no straining will be permitted to bring them to vertical position. The tolerance for verticality is one in 360 structure height.

2.7 Cabling: Cables shall be laid in trenches and the cables required for the job will be issued by the employer.

The length of each cable issued shall be judiciously cut minimizing the wastage. Cable laying shall also include termination of cables i.e. at both ends of cable at equipment control and protection panels etc. as well as equipment to marshalling boxes and marshalling boxes to switch gear panels. Cable lugs, cable terminating accessories like jointing ferrules, cable clamps, cable grips, cable compound flux, tapes etc. as necessary shall be procured by the contractor.

Cable lugs shall be compressed over the conductor ends with crimping tool. Insulating sleeves shall be provided and covered over the bare ends of the connections so as to prevent accidental contact with the adjacent terminals. The insulating sleeve shall be fire resistant and long enough to over pass the conductor insulation and shall be of correct size to the conductor used. The cables entering the control room from Indoor shall be sealed.

Standard cable grips and seals shall be utilized for cable pulling after laying the cable. Cable markers shall be put at both ends of the cables and at the RMU to be removed. The cable number and other data shall be punched and the cable markers are to be securely attached to the cables. Sharp bending and kinking of cables shall be avoided. In each cable run, some extra length shall be kept at a suitable point.

**3. Erection of Under Ground Cables:**

**Note: The bidder is to go through the technical specification of 33kv 1Cx630Sqmm UG cable kits attached with this bid along with the following details**

**3.1**CABLING AND OTHER EQUIPMENT:

3.1.1 Design, engineering, testing at works, type/acceptance/routine testing, packing,

loading, transportation, transit insurance, unloading at site, supply and delivery, storage insurance, installation and pre-commissioning, testing at site (including commissioning) of 33KV/11 KV cable double run, 33 KV SF6 Ring main Units, Cable jointing /termination kits and other accessories in respective 220KV 132KV /33/11 KV sub-stations to termination in 33 KV RMU’s. The cable and its accessories shall be complete with all fittings and components necessary for the satisfactory performance and ease of maintenance under the various operating conditions specified.

The commissioning of underground cable network shall be taken up in a coordinated manner so as to ensure minimum shut down time.

The contractor shall also be responsible for payment of any statutory taxes and

duties arising out of this to the appropriate authority and employer shall not assume

any liability for the same.

3.1.2 The scope also covers the complete laying (including civil works), jointing and

termination, testing and commissioning at site of the equipment, cable and

accessories. This shall mainly consist of:

a) Excavation of trenches and laying of cable.

b) Trenchless laying of Cable wherever required

c) Cable route markers of approved design shall be provided all along the route at a maximum distance of 100 meters and other important locations as per statutory requirements and Employer’s instructions. Also the location of underground cable with reference to permanent benchmarks shall be clearly indicated on the marker.

d) In addition, cable joint markers shall be provided at locations where straight through joints have been provided.

e) Bonding of screen/armour at both ends to the earth system.

f) Design, fabrication, and erection of steel structures [including its civil foundation] for supporting cable end terminations, foundation and structure for RMUs with all necessary accessories.

g) Backfilling of trenches & restoration as per requirements.

h) Testing and commissioning of equipments and systems under the scope of this bid

3.1.3 Documentation/SLD& Layout/ Equipment identification / O&M Manuals:

Underground cable route shall be generally along the overhead line route or the routes indicated in the bid. However Contractor shall carry out the design and finalize the routing of underground distribution network. Besides, the contractor shall furnish the following drawings, diagrams and data and also perform certain jobs for identification of equipment installed. Contractor shall supply four sets of hard copy and four sets of soft copy of these documents.

The following single line diagrams are to be supplied in Auto Cad format:

1.33/11 KV HT Net work with the following details

a) Length of each section;

b) Type and size of cable;

c) The substation points showing location and code number of the substations;

d) Number and Capacity of the existing transformers;

e) Location of the isolating point, if any and the normal cut-off point in the ring system

2. Land Based Map

a) The indicative route map to be provided to the contractor would indicate the proposed underground system.

b) The map is to be converted by the contractor in Auto Desk map format to “as built” by updating it with the details of the lines and the equipment actually installed.

c) IDENTIFICATION PAINTING (by enamel based water proof paint)

After completion of the job each equipment shall be painted with identification painting apart from providing data in the usual name plate such as

i) Code Number

ii) Incoming Source

iii) Destination of the outgoing circuit

iv) Location

3.1.4 Statutory Clearances:

The installation of cables and equipment shall be as per established code of practice and fulfill the requirements of statutes.

The bidder shall maintain all statutory clearances from other utility services, like telephones, water supply, power supply etc. The bidder shall obtain all necessary approvals from local authorities on behalf of TGSPDCL. However the road cutting charges will be paid **directly** to the concerned authority /the local body by TGSPDCL.

* 1. Any other items not specifically mentioned in the specification but which are required

for installation, testing, commissioning and satisfactory operation of the network as per Indian standards/IE Rules/IE Act and local authority regulations are deemed to be included in the scope of the specification and no deviation in this regard shall be accepted.

* 1. Before proceeding with the work the Contractor shall fully familiarize himself with

the site and route conditions etc. Though the Employer shall endeavor to provide all the information, it shall not be binding for the Employer/ to provide the same.

The bidders are advised to visit the sites and acquaint themselves with the topography, infrastructure etc. The bidder shall be fully responsible for providing all equipment, materials, system and services specified or otherwise which are required to complete the erection and successful commissioning of underground cable works and other equipment as specified in the bid schedule in all respects. All materials required for the Civil and construction/installation work shall be supplied by the Contractor including sand and brick for cable laying.

The Contractor, based on conceptual tender drawings, shall do then complete design and detailed engineering.

* 1. The Contractor shall also be responsible for the overall coordination with

internal/external agencies, project management, training of Employer’s manpower, loading, unloading, handling, moving to final destination for successful erection, testing and commissioning of the 33 kV/11kV under ground cable and other equipment

* 1. The scope includes construction power and water. The contractor shall arrange

construction water and power during construction stage at his own cost.

**3.6** PHYSICAL AND OTHER PARAMETERS

3.6.1 Location of the site

3.6.2 Meteorological data

The equipment to be installed shall be suitable for continuous satisfactory operation in tropical area in and around Hyderabad with high humidity and following prevailing climatic conditions.

A Average Grade Atmosphere Dry

B Ambient Air Temperature: Highest 50° C, Average 40° C

C Relative humidity 100% Maximum & 10% Minimum

D Rainfall 600 mm (Concentrated in 4 months)

E Basic wind speed as IS: 875 44m/sec.

F Seismic Zone 4

G Atmosphere Tropical in close proximity with high humidity and foggy and dusty condition

3.6.3 System Parameter

The brief particulars of the 33 system parameters are given here under:

(i) Nominal system voltage: 33 kV

(ii) Highest system voltage: 36 Kv(rms)

(iii) Impulse withstand voltage: 170 kV peak 1.2/50 micro seconds wave of positive/negative polarity

(iv) System Frequency: 50 Hz

(v) No. of phase per circuit: Three

(vi) System Earthing: Solidly grounded

(vii) One minute power frequency: 75Kv (rms) withstand voltage

(viii) Rated short time current: 25KA

(ix)Duration of fault current: 3 second for RMU/Breaker and one second for cable.

The brief particulars of the 11 system parameters are given here under:

(i) Nominal system voltage: 11 kV

(ii) Highest system voltage: 12 Kv(rms)

(iii) Impulse withstand voltage: 75 kV peak 1.2/50 micro seconds wave of positive/negative polarity

(iv) System Frequency: 50 Hz

(v) No. of phase per circuit: Three

(vi) System Earthing: Solidly grounded

(vii) One minute power frequency: 75KV(rms) withstand voltage

(viii) Rated short time current: 25KA

(ix)Duration of fault current: 3 second for RMU/Breaker and one second for cable.

**INSTALLATION DATA:**

Brief particulars of installation data are as under:

Location:

Route: Please refer enclosed drawing.

Type of laying: Direct burial in ground

Max. Soil temperature: 35 degree C at cable depth

Characteristics of soil: Hard rock and Hard gravel but generally leveled. Presence of micro-organisms in the soil shall be taken into account.

Thermal resistivity of soil: 100/120 deg. C cm/w[for information only, however exact value to be assessed by bidder ]

Type of the road surface: To be physically examined by bidder based on route layout.

3.6.4 Soil Data

The bidder shall be responsible for carrying out the required tests and should fully satisfy him about the nature of soil including the earth resistivity expected to be encountered prior to the submission of bid. Any variation of soil data during detailed engineering or construction stage shall not constitute a valid reason in affecting the terms and conditions of the bid or any extra price.

**3.7** SCHEDULE OF QUANTITIES

The detailed bills of quantity of major items/works are indicated in the Bid Price Schedules (BPS).

Wherever the quantities of items/works are not indicated, the bidder is required to estimate the quantity required for entire execution and completion of works and incorporate their price in respective Bid Price Schedules. Any material/works not specifically mentioned in the description in BPS, as may be required shall be deemed to be included in the bid itself and shall be provided at no extra cost to Employer.

**3.8** BASIC REFERENCE DRAWINGS

The enclosed indicative drawings give the basic scheme, layout etc. In case of any discrepancy between the drawings and text of specification, the requirements of text shall prevail in general.

However, the Bidder is advised to get these clarified from Employer, before submission of bids, in case of any doubt.

**3.9** TOOLS AND TACKLES

The bidder shall make the deployment of all special tools and tackles required for erection, testing, commissioning and maintenance of equipment.

**3.10** SPECIFIC REQUIREMENT

The bidder shall be responsible for safety of human and equipment during the working. It will be the responsibility of the Contractor to co-ordinate and obtain, required clearance before commissioning. Any additional items, modification due to observation of such statutory authorities shall be provided by the Contractor at no extra cost to the Employer.

**3.11** RESTORATION OF ROADS:

a) The authorities owning the road en route would allow Road cuttings along the road, sides and on all the crossings.

b) Road cuttings are to be done by the contractor whereas the road cutting charges will be paid directly to the concerned authority /the local body by TGSPDCL.

c) Contractor shall be responsible for back filling and compaction of the trenches dug for laying of the cable.

**3.12** SHUT DOWN PLANNING:

Contractor shall carry out careful and detail pre- planning for the shut down schedules to minimize the number and duration of shut down in consultation with TGSPDCL.

• Shut down conditions shall be clear specifying designation of person responsible for giving LC (line clear)

• Authorization of personnel from the contractor’s side.

• Contractor shall fix the times for shut down preferably early morning and not later than 5 PM in the evening.

• All safety precautions for public and dept personnel, restoration of supply should be readily explained while returning LC.

**3.13** Additional items:

In case any additional equipment is required to be installed which is not covered in tender document, the payment (rates) for such equipment shall be made at “Standard Estimate & Schedule of Rate” prevailing at the date of bid opening.

**3.14** CABLE ROUTES**:**Contractor shall carry out site survey and finalize cable routing by carrying outmodification to the drawings enclosed with tender documents to take intoconsideration the design criteria.

1.1 Optimization of Cable lengths: Based on the tender drawings, route survey tobe checked by the contractor and taking into consideration of transport limitation Wastage up to 1% of total length of cable length laid for eachtype/rating shall be permitted individually. Recovery shall be made forwastage of cable in excess of 1%.

Cable as per scope indicated in this specification, shall be laid underground inflat formation throughout the route.

• In DWC/GI/Hume pipe.

• In air at terminations.

• At varying depths due to obstructions.

• As per approved drawings;

• Railway crossing;

• Road crossing;

The bidder may visit the site and get him acquainted with the proposed cableroute and soil condition to enable him to submit a realistic offer.

* 1. EARTHING:
* All metal parts including cable amour not intended for carrying current or not alive shall be connected to duplicate earthing system. Earth continuity conductors shall be provided down to the ground level for earth connection to earth pit. It shall have sufficient cross sectional area to afford a low resistant path for the full fault current envisaged.
* The size of the earth continuity conductor shall also be large enough to reduce the potential rise of the metal frame of the equipment in the event of fault to minimum but in any case not more than 10V. The size of the earth terminals and conductors shall be adequate to restrict the temperature rise without causing any damage to the earth connection in the case of fault. No riveted joints in the earth conducting path shall be permissible and only bolted joints of adequate size shall be provided with GI nuts, bolts and plain and spring washers. The surfaces to be jointed shall be perfectly flat without any unevenness to ensure that there is no contact resistance.
* An earth bus bar of copper strip of adequate size shall be provided inside all RMUs. The earth bus bar shall be terminated into two earthing terminals of adequate size with GI nuts, bolts and washers for connecting to earth continuity conductor mentioned above to which all earthing connections must be made.
* The earth pit shall be made by digging pit of size 600\* 600\*2000mm and planting a 2 meter 80 mm dia CI earth pipe therein. The Earth pit shall be back filled with a mixture of Bentonite and black cotton soil to to improve the earth conductivity. The earth electrode shall be connected SS earth riser from the earth pipe shall consist of GI flat of 25\*6 mm. The GI flat shall then be connected to the earth continuity conductor mentioned above and also the armour of the cables.
* The CI pipe mentioned above would project 50 mm above the ground levelas it should be visible and can be used for pouring water during the dry seasons.
* All earthing shall strictly follow the provisions of Indian Electricity Rules 1956.

**3.16** DANGER PLATES

Danger plates shall be provided on all equipment as per the statutory

**3.17** GENERAL REQUIREMENT

3.17.1 The bidders shall submit the technical requirements, data and information as per the technical data sheets provided in the bid documents.

3.17.2 The bidders shall furnish engineering data, technical information, design documents, drawings etc fully.

3.17.3 It is recognized that the Bidder may have standardized on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer’s standard practice will also be considered provided such proposals meet the basic designs, standard and performance requirements and are acceptable to the TGSPDCL. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously..

3.17.4 Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the work unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost.

All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

**3.18**STANDARDS

3.18.1 The works covered by the specification shall be designed, engineered, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.18.2 The Bidder shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC.

3.18.3 When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

3.18.4 Other internationally accepted standards, which ensure equivalent or better performance than that specified in the standards referred, shall also be accepted. Copies of such standards shall be submitted by the bidder along with the bid.

3.18.5 The bidder shall clearly indicate in his bid the specific standards in accordance with which the works will be carried out.

**3.19**DRAWINGS

All titles, noting, markings and writings on the drawing shall be in English.

All the dimensions should be in metric units.

**3.20**TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

3.20.1 His duly authorized representative and/or outside inspection agency acting on behalf of the TGSPDCL shall have at General Technical Requirement all reasonable times free access to the Contractor and the Subcontractor’s remises or Works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the Works during execution or erection.

Inspection may be made at any stage of execution of work, or at site at the option of the Employer and if found unsatisfactory due to bad workmanship or quality, TGSPDCL reserves the right to stop the such work and appropriate action may be initiated as per rules in vogue.

3.20.2 In all cases where the Contract provides for tests whether at the premises or at the works of the Contractor or the Sub-contractor, the Contractor except where otherwise specified shall provide free of charge such items as labour, materials, electricity,

fuel, water, stores, apparatus and instruments as may be reasonably demanded by the or his authorized representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the or to his authorized representative to accomplish testing.

**3.21**TESTS AT SITE

3.21.1 Pre-commissioning Tests

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the and the contractor for correctness and completeness of installation and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed shall be included in the Contractor’s quality assurance programme.

3.21.2 Commissioning Tests

3.21.2.1 All required instrumentation and control equipment will be used during such tests and the contractor will use all such measuring equipment and devices duly calibrated as far as practicable. However, the Contractor, for the requirement of these tests, shall take immeasurable parameters into account in a reasonable manner. The tests will be conducted at the specified load points and as near the specified cycle condition as practicable. The contractor will apply proper corrections in calculation, to take into account conditions, which do not correspond to the specified conditions.

3.21.2.2 Any special equipment, tools and tackles required for the successful completion of the Commissioning tests shall be provided by the contractor, free of cost.

3.21.2.3 The specific tests to be conducted on equipment have been brought out in the respective chapters of the technical specification. However where the pre-commissioning tests have not been specified specifically they shall be as per relevant IS code of practice or as mutually agreed.

3.21.3 The Contractor shall be responsible for obtaining statutory clearances excluding the road cutting charges from the concerned authorities for commissioning and operation of the equipment.

The Contractor shall be responsible for any loss or damage during transportation, handling and storage.

**3.22** All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all cables, valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.

**3.23**FINISHING OF METAL SURFACES

3.23.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized or subjected to weatherproof painting after fabrication. High tensile steel nuts & bolts and spring washers shall be electro galvanized to service condition 4. All steel conductors including those used for earthing/grounding (above ground level) shall be with anticorrosive Bituminous paint.

**3.24** HOT DIP GALVANISHING

3.24.1 The minimum weight of the zinc coating shall be 610 gm/sq. m and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM.

**3.25** PAINTING

3.25.1 Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by sand/shot blasting and thereafter by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

3.25.2 The exterior color of the paint shall be as per shade no: 697 of IS-5and inside shall be glossy white for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

**3.26** HANDLING, STORING AND INSTALLATION

3.26.1 In accordance with the specific installation instructions as shown on manufacturer’s drawings or as directed by the or his representative, the Contractor r shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energization at rated voltage.

3.26.2 In case of any doubt/misunderstanding as to the correct interpretation of manufacturer’s drawings or instructions, necessary clarifications shall be obtained from the TGSPDCL. The Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer’s drawings/instructions correctly.

3.26.3 The Contractor shall be fully responsible for the equipment/material until the same is handed over to the TGSPDCL in an operating condition after commissioning. Bidder shall be responsible for the maintenance of the equipment/material while in storage as well as after erection until taken over to the TGSPDCL, as well as protection of the same against theft, element of nature, corrosion, damages etc.

3.26.3 Where material/equipment is unloaded by before the Contractor arrives at site or even when he is at site, by right can hand over the same to Contractor and there upon it will be the responsibility of Contractor to store the material in an orderly and proper manner.

3.26.4 The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipment, which require indoor storage or installation.

3.26.5 The words ‘erection’ and ‘installation’ used in the specification are synonymous.

3.26.6 Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes and Indian Electricity Rules, 1956 and Electricity Act.

3.26.7 The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances as given in clause 12.10 the Contractor shall immediately proceed to correct the discrepancy at his risks and cost.

**3.27** TOOLS AND TACKLES

The Contractor shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly General Technical Requirement and maintenance of the equipment. However, these tools and tackles shall be separately, packed and brought on to Site.

**3.28** NAME PLATE/ LABELS:

All apparatus shall be clearly labeled. Details of name plate/ labels of major equipment shall be submitted to for approval.

**3.29** EARTHING

All non alive metal parts of every equipment shall be double earthed in accordance with I E Rules, 1956. They shall include the following:

i. RMU, Double Extensible On Load Switch with breaker

ii. The steel structural parts, where provided;

iii. Cable armour/metallic screen.

**4. LAYING AND INSTALLATION**

**4.1 CABLE LAYING (33/11 KV):**

Cable as per scope indicated in this specification, shall be laid underground in flat formation throughout the route as per relevant IS and approved drawing. However, as per requirement of the field, the cables shall also have to be laid:

* Digging of trenches would have to be done in all types of surfaces, which may include soft soil, hard soil, rocky soil or even along the side of the road with a width 0.45mtrs X and 1.20 Mtrs for single trench and 0.50mtrs X and 1.20 Mtrs depth for double trench from road level.
* In many cases the digging of trenches and cable laying are to be done along narrow road with high traffic.
* Filling with sand for 75 mm

**4.2**As per requirement of the field, the 33 KV 3 X 400 sq.mm XLPE UG cable shall also have to be laid:

1. In Hume Pipe or GI pipe.

2. In air at terminations in GI pipe of length 2.5Mtrs.

3. At varying depths due to obstructions.

4. The cost of Hume pipe/GI pipe and accessories such as clamp etc.should be included in the bid price.

In general, the cables would be laid along the road and in certain cases along the sides of the roads in case such berm is not available in narrow roads.

* Covering the laid cable with a sand layer of 200mm on the laid cable
* Providing of protective cover of shabad stones (0.3x0.5m) with 2 inch thickness over the sand
* The cable has to be rerouted for laying along roads even if not shown in the bid document drawing, in consultation with Employer site engineer.
  1. The route plan of the cable is enclosed with bid documents to enable the bidder to have a correct assessment of the work involved. The final route shall however be site specific. The contractor shall prepare the final route drawing based on the design and planning criteria provided in this document and get the same approved from Employer before starting the cable laying work.
  2. As applicable for 33 kV 1 Core 400 Sqmm

**4.3TRENCHING**

The cable trench work involves earth excavation for cable trench, backfilling and removal of excess earth from site. The work site shall be left as clean as possible. The trench shall be excavated using manual and mechanical methods including air compressor driven pneumatic drill as per field conditions.

Most main roads are of asphalt surface and some of the roads with cement concrete surface.

An air compressor with pneumatic drill or equivalent mechanical tool will be essential if the road crossings are to be speedily made. Special system of laying Hume pipe under road without digging the surface may be adopted if feasible.

Where paved footpaths are encountered, the pavement slabs shall be properly stored and reinstated. Identification markers of other services shall be properly stored and restored.

The sides of the excavated trenches shall, wherever required, be well shored up with timber and sheeting.

**4.4 Cable Laying and Installation**

* Suitable wooden/ sheet steel barriers should be erected between the cable trench and pedestrian/ motorway to prevent accidents.
* The barrier could be made out of sheet steel or wood planks. These could be portable types of size 1.5 m long by 1.2 m (height).
* These should be painted with red and white colored cross stripes.
* Warning and caution boards should be conspicuously displayed.
* Red lights as warning signal should be placed along the trench during the nights.
* The excavated material shall be properly stored to avoid obstruction to public and traffic movement.
* The bottom of the excavated trench should be leveled flat and free from any object, which would damage the cables. Any gradient encountered shall be removed.

**4.5 TRIAL HOLES**: The bidder shall excavate trial holes, for alignment purpose at appropriate distance apart as warranted by the local conditions, keep a record of findings and close the trial holes properly to avoid hindrance / accidents to pedestrian traffic.

The final route alignment of cable shall be decided based on the finding of the trial hole.

It is the responsibility of the contractor to maintain as far as possible the required statutory clearances from other utility services.

Any damage caused, inadvertently to any utility services shall be the sole responsibility of the contractor.

The scope also includes the Trench less laying of H.T.Cables.

**4.6 CABLE HANDLING**

The inspection of cable on receipt, handling of cables, paying out, flaking, cushioning with sand or sieved compacted native soil, back-filling, reinstatement of road surfaces, providing and fixing joint markers, route markers , precautions of joint pits, sump holes and all necessary precautions that are required shall be carefully planned and in general conform to IS 1255-1983 or its equivalent.

**4.7 DAMAGE TO PROPERTY**

The contractor shall take all precautions while excavation of trench, trial pits etc., to protect the public and private properties and to avoid accidental damage. Any damage so caused shall be immediately repaired by contractor at his own cost and brought to the notice of the concerned persons and to the Employer.

- Contractor shall arrange third party liability insurance for the above purpose.

- The contractor shall bear all responsibilities and liabilities and shall bear all costs of the damages so caused by him or by his workman oragents.

- At places where the cables cross private roads, gates of residential houses or buildings, the cables shall be laid in RCC hume pipes.

**4.8 CABLE ROUTE MARKERS/CABLE JOINT MARKERS**

Permanent means of indicating the position of joints and cable route shall be fabricated, supplied and erected.

Route Marker shall be provided at every 100 meter and at the turning points. Markers provided shall be as per the field requirement. If the route passes through open fields, markers should be conspicuously visible and above ground surface and particularly along the Road berms except on road & pavements where they may interfere in the movement of traffic or pedestrians*.*

The markers should incorporate the relevant information. The name of the owner, voltage shall be marked on the route marker.

The markers shall be of stone or tile construction. The design shall be such that it cannot be pulled out. Tile type marker shall be used along the pavement. Stone/ PCC markers shall be used at other locations. The stone/PCC markers shall be cut into proper size as per drawing, covered with cement plaster with engraving of the information required.

**4.9 DEPTH OF LAYING & SPACING BETWEEN CABLES:**

Minimum depth of laying from ground surface as following: or as per the schedule/existing trench size

33kV Cable :1.20meter

11 kV cable :1.05 meter

Wherever the proper depth is not achievable due to presence of other services or for other reasons, the cable shall be laid deeper or in hume pipe or GI pipe as required depending upon the site condition.

**The pipes shall be laid by the Contractor at no extra labour cost.**

**4.10 PAYING OUT THE CABLE**

The excavated cable trench shall be drained of all water and the bed surface shall be smooth, uniform and fairly hard before paying out the cable. The cable shall be rolled in the trench on cable rollers, spaced out at uniform intervals. The paying out process must be smooth and steady without subjecting the cable to abnormal tension. The cable on being paid out shall be smoothly and evenly transferred to the ground after providing the sand cushion. The cables shall never be dropped. All snake bends shall be straightened. Suitable size cable stocking pulling eye shall be used for pulling the cable. While pulling the cable by winches or machines, the tension loading shall be by tension indicator and shall not exceed the permissible value for the cable. The cable laying shall be performed continuously at a speed not exceeding 600 to 1000 meter per hour.

The cable end seals shall be checked after laying and, if found damaged, shall immediately be resealed. Sufficient number of heat shrinkable cable end sealing caps shall be stocked at site stores for testing and jointing work. The integrity of the outer sheath shall be checked after the cable is laid in position.

**4.11 SAND BEDDING AND BRICK**

The cable shall be completely surrounded by well-compacted sand to such a thickness and of such size that the cable is protected against damage. The thickness of the cable sand should normally be a minimum of 250 mm depth. Cable sand with a grain size less than 8 mm shall be preferred to offer good protection to cable.

A brick (of brick class designation 75) layer of thickness 70 mm brick shall be provided between the cables for cable separation for every 10 meters.

**4.12 FLAKING**

The cables shall be flaked and left with slight extra lengths at jointing bays for expansion and flexibility.

**4.13** Sand Bedding shall be provided as detailed in section 4.11 and no special thermal back filling is required.

**4.14 BACK FILLING**

Normally back filling shall consist of the material earlier excavated. However, bigger stones or pieces of rock should be removed.

**4.15 PREVENTION OF DAMAGE DUE TO SHARP EDGES**

After the cables have been laid in the trench and until the cables are covered with protective covering, no sharp metal tool shall be used in the trench or placed in such a position that may fall into the trench.

Straight and curved rollers used shall have no sharp projecting parts liable to damage the cable.

While pulling through pipes and ducts, the cable shall be protected to avoid damage due to sharp edges.

The cables shall never be bent, beyond the specified bending radius.

**4.16 ROAD, RAILWAY TRACKS, WATER PIPE LINE CROSSINGS**

DWC/GI pipe shall be used for crossing of Road for railway track and water pipe line. One spare pipe at each location of 33kV & 11 kV cable crossing shall be laid. Cable pipe size/laying details shall be as per IS 1255-1983. The road cutting for cable trench, whether cement concrete, asphalt or macadam road surface shall be undertaken after obtaining approval for cutting from the road owning authorities, traffic police, telephone authorities and work should be planned to be completed in the shortest possible time. Where necessary the work shall be planned during night or light traffic periods. The railway track crossing design shall be got approved from the railway authorities and the contractor shall do work in coordination with them.

In the excavated trench across the road the pipes shall be laid, excavation backfilled compacted and surface shall be redone in the shortest possible time.

Open Drain Crossing: Where ever the cable has to cross open drains, with long span, the cable shall be laid in suitable size G. I. pipe properly joined with suitable collars. The GI pipe shall be firmly supported on pillars, columns, or suitable support of RCC foundation.

**4.17 FOOT PATH CUTTING**

The slabs, kerbstones, on the roads/ footpath shall be removed and reinstated without damage.

**4.18 REINSTATEMENT**

After the cables and pipes have been laid and before the trench is backfilled, all joints and cable positions should be carefully plotted in drawing and preserved and provided to the Engineer of TGSPDCL.

The protective covers shall then be provided, the excavated soil riddled, sieved and replaced. It is advisable to leave a crown of earth not less than 50 mm and not more than 100 mm in the centre and tapering towards the sides of the trench.

The temporary reinstatement of roadways should be inspected at regular intervals, more frequently in rainy season and immediately after overnight rain for checking settlement and if required, the temporary reinstatement should be redone.

After the subsidence has ceased the trench may be permanently reinstated and the surface restored to the best possible condition.

In case of the road surface is cement concrete, asphalt or tarred macadam, resurfacing may be done by the civic authorities against payment of the restoration charges to be made by the contractor.

**4.19 JOINTING BAYS**

The bidder shall identify the location of the joint bays after carrying out detailed survey of the cable route and excavation of the trial pits. The delivery lengths of the cables shall match the location.

The joint bay should have a flat and level surface. At the bottom in a corner, a sump pit shall be made, if necessary, for bailing out water.

The contractor shall follow standard practice in making joint bay, jointing and back filling after making joint and testing for the voltage class required.

All works shall be carried out in presence and supervision of the Engineer of TGSPDCL

**4.20 TOOLS AND PLANTS**

The successful bidder shall have all necessary tools, plant and equipment to carry out the survey and cable installation work.

The bidders are instructed to give all the details of equipment at their disposal, to carry out the work successfully and speedily.

**4.21 BENDING RADIUS:**

The minimum bending radius of XLPE insulated cables is as follows:

**Cable Bending radius**

***Three Core 15 x D***

“D” means the overall diameter of the completed cable.

**4.22 JOINTING AND TERMINATION OF CABLES**

**4.23 TESTS AFTER INSTALLATION**

All tests as prescribed in Clause-6 of IEC-840 shall be performed after installation of cable. Following minimum tests shall be carried out:

a) Insulation Resistance of each cable drum length after paying but before jointing.

b) Serving insulation resistance after laying each cable length shall withstand a voltage of 5 kV DC between each reinforcement and external conducting surface for one minute. In addition, the serving insulation resistance shall be measured and checked with the values obtained in the routine factory test.

c) On completion of the cable laying and jointing work, the complete installation shall be tested with a D.C. voltage (high Voltage Test) as per IS 1255.

d) Conductor resistance of each cable of each complete circuit shall be measured and compared with the values obtained during routine factory tests.

e) Test for 5 minutes with system voltage applied between the conductor and the armour/ screen earthed.

f) Test for 24 hours with normal operating voltage of the system.

**B. FOUNDATION / RCC CONSTRUCTION**

**General**

1. Work covered under this Clause of the Specification comprises the design and construction of foundations and other RCC constructions for switchyard structures, equipment supports, trenches, control cubicles, bus supports, and systems, or for any other equipment or service and any other foundation required to complete the work. This clause is as well applicable to the other ECC constructions.

2. Concrete shall conform to the requirements mentioned in IS: 456 and all the tests shall be conducted as per relevant Indian Standard Codes as mentioned in Standard field quality plan appended with the specification. A minimum grade of M20 concrete (1:1.5:3 mix) shall be used for all structural/load bearing members as per latest IS 456.

3. If the site is sloppy, the foundation height will be adjusted to maintain the exact level of the top of structures to compensate such slopes.

4. The switchyard foundation’s plinths and building plinths shall be minimum 300 mm and 500 mm above finished ground level respectively.

5. Minimum 75 mm thick lean concrete (1:4:8) shall be provided below all underground structures, foundations, trenches, etc., to provide a base for construction.

6. Concrete made with Portland slag cement shall be carefully cured and special importance shall be given during the placing of concrete and removal of shuttering.

7. The design and detailing of foundations shall be done based on the approved soil data and sub-soil conditions as well as for all possible critical loads and the combinations thereof. The Spread footings foundation or pile foundation as may be required based on soil/sub-soil conditions and superimposed loads shall be provided.

8. If pile foundations are adopted, the same shall be case-in-situ driven/border precast or under reamed type as per relevant parts of IS Code 2911.Only RCC piles shall be provided. Suitability of the adopted pile foundations shall be justified by way of full design calculations. Detailed design calculations shall be submitted by the bidder showing complete. Details of piles/pile groups proposed to be used. Necessary initial load test shall also be carried out by the bidder at their cost to establish the piles design capacity. Only after the design capacity of piles has been established, the Contractor shall take up the job of piling. Routine tests from the piles shall also be conducted. All the work (design & testing) shall be planned in such a way that these shall not cause any delay in project completion.

D**esign**

1. All foundation shall be of reinforced cement concrete. The design and construction of RCC structures shall be carried out as per IS: 456 and minimum grade of concrete shall be M-20. Higher grade of concrete than specified above may be used at the discretion of Contractor without any additional financial implication to the Owner.

2. Limit state method of design shall be adopted unless specified otherwise in the specification.

3. For detailing of reinforcement IS: 2502 and SP: 34 shall be followed. Cold twisted deformed bars (Fe=415 N/mm2) conforming to IS: 1786shall be used as reinforcement. However, in specific areas, mild steel(Grade-I) conforming to IS: 432 can also be used. Two layers of reinforcement (on inner and outer face) shall be provided for wall and slab sections having thickness of 150 mm and above. Clear cover to reinforcement towards the earth face shall be minimum 40 mm.

4. The procedure used for the design of the foundations shall be the most critical loading combination of the steel structure and or equipment and or superstructure and other conditions, which produces the maximum stresses in the foundation or the foundation component and as per the relevant IS Codes of foundation design. Detailed design calculations shall be submitted by the bidder showing complete details of piles/pile groups proposed to be used.

5. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly.

6. Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.

7. RCC columns shall be provided with rigid connection at the base.

8. All sub-structures shall be checked for sliding and overturning stability during both construction and operating conditions for various combinations of loads. Factors of safety for these cases shall be taken as mentioned in relevant IS Codes or as stipulated elsewhere in the Specifications. For checking against overturning, weight of soil vertically above footing shall be taken and inverted frustum of pyramid of earth on the foundation should not be considered.

9. Earth pressure for all underground structures shall be calculated using coefficient of earth pressure at rest, co-efficient of active or passive earth pressure (whichever is applicable). However, for the design of sub structures of any underground enclosures, earth pressure at rest shall be considered.

10. In addition to earth pressure and ground water pressure etc., a surcharge load of 2T/Sq.m shall also be considered for the design of all underground structures including channels, sumps, tanks, trenches, sub-structure of any underground hollow enclosure, etc., for the vehicular traffic in the vicinity of the structure.

11. Following conditions shall be considered for the design of water tank in pumps house, channels, sumps, trenches and other underground structures:

a) Full water pressure from inside and no earth pressure and groundwater pressure and surcharge pressure from outside (application only to structures, which are liable to be filled up with water or any other liquid).

b) Full earth pressure, surcharge pressure and ground water pressure from outside and no water pressure from inside.

c) Design shall also be checked against buoyancy due to the groundwater during construction and maintenance stages. Minimum factor of safety of 1.5 against buoyancy shall be ensured ignoring the superimposed loadings.

12. The foundations shall be proportioned so that the estimated total and differential movements of the foundations are not greater than the movements that the structure or equipment is designed to accommodate.

13. The foundations of circuit breaker shall be of block type foundation. Minimum reinforcement shall be governed by IS: 2974 and IS: 456.

14. The tower and equipment foundations shall be checked for a factor of safety of 2.2 for normal condition and 1.65 for short circuit condition against sliding, overturning and pullout. The same factors shall be used as partial safety factor overloads in limit state design also.

**Admixtures & Additives**

1. Only approved admixtures shall be used in the concrete for the Works. When more than one admixture is to be used, each admixture shall be batched in its own batch and added to the mixing water separately before discharging into the mixer. Admixtures shall be delivered in suitably labeled containers to enable identification.

2. Admixtures in concrete shall conform to IS: 9103. The water proofing cement additives shall conform to IS: 2645. Owner shall approve concrete

3. The Contractor may propose and the Owner may approve the use of a water-reducing set-retarding admixture in some of the concrete. The use of such an admixture will not be approved to overcome problems associated with inadequate concrete plant capacity or improperly planned placing operations and shall only be approved as an aid to overcoming unusual circumstances and placing conditions.

4. The water reducing set-retarding admixture shall be an approved brand of Ligno-sulphonate type admixture.

5. The water proofing cement additives shall be used as required/advised by the owner.

**Technical specification of 11 kV/LT jointing kits**

**1.1General**: The cable jointing personnel and his crew shall have good experience in the type of joints and terminations that are used.

The jointing work shall commence as soon as two or three lengths of cables have been laid.

The cable jointing accessories shall include the end terminating kits, straight through joints, and also any special tools and tackles required for making these joints.

The contractor shall minimize the use of straight joints.

All care should be taken to protect the factory-plum bedcaps/ seals on the cable ends, and the cable end shall be resealed whenever the end is exposed for tests.

Jointing of cables in carriage ways, drive ways under costly paving, under concrete or asphalt surfaces and in proximity to telephone cables and water mains should be avoided wherever possible.

Sufficient over lap of cables shall be allowed for making the joints.

The joint bay should be of sufficient dimensions to allow the jointers to work with as much freedom of movement and comfort as possible.

Sufficient space should be kept below the cable to be jointed. The joints of different phases shall be staggered.

All jointing shall be done by joint manufacturer’s jointers or under their supervision.

* 1. **TENTS / COVERS**

An enclosure or suitable protection cover shall be used in all circumstances wherever jointing work is carried out in the open irrespective of the weather conditions. The joint shall be made in dust free and clean atmosphere.

* 1. **PRECAUTIONS BEFORE MAKING A JOINT/ END TERMINATION**

The cable end seals should not be opened until all arrangement have been made for jointing and all necessary precautions have been taken to prevent circumstances arising out of rainy/ inclement weather conditions, which might become uncontrollable.

If the cable end seals or cable ends are found to have suffered damage the cables should not be jointed, without tests and rectification.

* 1. **MEASUREMENT OF INSULATION RESISTANCE**

Before and after jointing, the insulation resistance of both sections of cables shall be checked.

* 1. **IDENTIFICATION:** The identification of each phase shall be clearly and properly noted. The cables shall be jointed as per the design approved by the

TGSPDCL based on the proposal submitted by the Contractor. Each cable shall have identification for phase and circuit at joint bays.

* 1. **MAKING A JOINT/ END TERMINATION**

Comprehensive jointing instructions should be obtained from the manufacture of jointing/end kits and meticulously followed.

The materials used in the joints/ end kits like Mechanical connectors, screen/armour continuity bonds, lugs etc., shall be of good quality and conform to standards.

The jointing tools shall be appropriate and as per the requirement of jointing XLPE/PVC cables.

**1.7 CABLE TERMINATIONS**

The cable terminations used are to be of outdoor type.

The preparation of the cable end for installing the terminations and the precautions to be taken before fixing the terminations shall be followed as in the case of the cable jointing procedures.

The instructions furnished by the termination manufacturer shall be strictly followed.

All terminations shall be done by joint manufacturer’s jointers or under their supervision.

At cable terminating end, the following provisions for supply and erection are to be included.

(i) A terminating structure should be provided where necessary for supporting the cable to be terminated (except at the ring main unit ends)

(ii) A sufficient length of spare cable shall be left in the ground, for future needs.

(iii) The rise of the cable immediately from the ground shall be enclosed in 225 mm dia GI pipe to protect against direct exposure to the sun.

(iv) The cable shall be properly fastened to the support using non-metallic clamps.

(v) Appropriate labels shall be fixed identifying the phase circuit, voltage and date of commissioning etc., on the cable supporting structure.

(vi) The sealing end shall be mounted on insulators to isolate them from their supporting steel work.

(vii) Protection from contact with the exposed metal work at the termination shall be provided by resin bonded glass fiber shroud.

(viii) Providing earth stations with all required materials, like leads, connectors etc for earthing of armour and screen.

**1.8 BONDING OF SCREEN / ARMOUR**

The screens and armour at both ends shall be brought out and solidly bonded to the earth station.

All accessories and consumables used in the termination should be of good quality and compatible with the cable.

**1.9 CONNECTION OF RADIAL WATER BARRIER AND CABLE SCREEN**

If the metallic radial water barrier is insulated from the metallic wire screen a connection suitable to carry the currents occurring during operation must be installed between metallic radial water barrier of the cable and metallic wire screen in joints and sealing ends.

**1.10 ERECTION OF CABLE TERMINATING STRUCTURES.**

* The terminating structure should be designed as per the requirement of the cable end sealing, offered by bidder.
* The mounting structure shall be of latticed Steel structure suitably grouted to the ground.
* After fixing the end termination, the cable shall be fixed to the support, with non-magnetic material clamps to the required height securely.
* The mounting structure includes the supports for cable end boxes, link boxes and any other structure required for the intent of the contract.
* All steel sections used shall be free from all imperfections, mill scales, slag intrusions, laminations, fillings, rust etc., which may impair their strength, durability and appearance. All materials shall be of tested quality only unless otherwise permitted by the TGSPDCL. The Contractor shall fabricate, provide and install the structures.

**2.0. SERVICE CONDITIONS**

2.1. Ambient air temperature range 5°C to 50°C

2.2 Height of Installation 700 meters above sea level .

2.3 Terrain Rocky terrain and some areas are hilly

2.4 Atmospheric conditions foggy and dusty atmosphere

2.5 Maximum relative humidity 100%

2.6 Average annual rainfall 400mm approx.

**3.0 GENERAL REQUIREMENTS**

3.1 Compliance with standards

REFERENCES:

1. Standard Number ESI-09-13- Performance Specification for high voltage, heat shrinkable components for use with high voltage solid cables up to an including 33,000 volts.
2. IS 13573-2010 Type Test and Performance Requirements for cable Terminations and Joints on XLPE Cables from 6.6 KV to 33 KV ratings.
3. IEC 61238-1: Compression and Mechanical Connectors for Power Cables with copper or aluminum conductors - Tests Materials and Requirements.

3.2 Quality, Environmental Management **System and Laboratory Accreditation**

3.2.1 The Tenderer shall have a valid IS09001:2000 Quality Management System(QMS) certificate for the goods offered. The goods include the shrinkable and moulded components, as well as connectors.

The scope (extent) of the certification shall cover at least the design, development, production, installation and servicing of the offered goods.

In case of tenderers who act as kitters, the scope (extent) of the certification shall cover at least the production of the offered goods. This is in addition to the requirement for the design of the offered goods, which shall be under the QMS certificate of the manufacturer. The kitter shall also have a valid authorization by the manufacturer of the shrinkable components, authorizing the kitter.In case the execution of the whole or any part of the work will be sub-contracted by the Tenderer to another company, the requirement pertaining to the Tenderer's Quality, Environmental Management System and Laboratory Accreditation will be satisfied, if the said requirement is possessed by the company which will actually undertake such execution.

3.2.2 The following requirements are additional to the requirements of the Specification

* The Tenderer shall have a valid IS014001:2000 Environmental Management System certificate. A copy of a valid IS014001:2000 Certificate should be submitted with the Tender.
* The Manufacturer Testing Laboratories shall be accredited to the ISO17025. A copy of a valid ISO 17025 Certificate should be submitted with the Tender.

In case the execution of the whole or any part of the work will be sub-contracted by the Tenderer to another company, the requirement pertaining to the Tenderer's Quality, Environmental Management System and Laboratory Accreditation will be satisfied, if the said requirement is possessed by the company which will actually undertake such execution.

3.3 **Units of measurement**

In all correspondence, in all technical schedules and drawings metric units of measurement shall be used.

3.4 **General requirements for Kits**

All materials in the Joint/termination kits offered shall be the latest designs incorporating improvements in materials and installation procedures.

The jointing/termination materials and components shall be offered in the form of kits. The kits shall be supplied complete with all necessary tubings and components. The kits shall include connectors, lugs and all other accessories to form a ready to energize joint/termination.

All components mentioned in paragraph 7.4, as well as all other pre moulded or elastic components comprising a Joint/Termination kit, shall be designed and manufactured by the same manufacturer, excluding the stress control tube.

**3.5 Packing and Marking**

The joint/termination kit shall be properly packed with all the shrinkable tubings, moulding components and connectors, lugs, other accessories as required toform a self contained kit. The packing shall be of such design as to prevent moisture and dust ingress and shall also protect the contents against mechanical damage. External packing shall carry a label with the following information clearly marked:

* Name of Manufacturer
* Manufacturers reference
* Year of Manufacture/ Purchase order No.
* Expiry date whenever applicable

The kits shall also include the following:

1. Installation Instruction sheet manuals containing complete step by step instructions in the English language.
2. A check list stating the quantities and description of components contained

in the kit shall be supplied in each kit.

Each component of the kit shall be separately packed in polyethylene and component name/part number shall be marked on the polyethylene packing.

All materials and components comprising the kit shall be clearly and permanently marked in a prominent position with the supplier's/manufacturer's name, product identification, batch number and year of manufacture. The batch number shall allow for full traceability of manufacture including the new materials which make up the polymeric compounds used in extrusion and moulding processes. Extruded components (tubing and wrap-arounds) shall additionally be marked with their expanded and fully recovered internal diameter. They may alternatively be marked with the upper and lower diameters of their range of application.

Markings on extruded components shall be repeated along the length with gaps not exceeding 200mm. Components which cannot be marked shall have the above information provided on immediate packaging.

Packed kits shall be packed in carton boxes which shall be placed in wooden pallets in order to facilitate fork-lift handling. The carton box to be permanently fixed to the wooden pallet and consideration to be given to the fact that the boxes shall have maximum height 140cm. The packing are to be wrapped with strong nylon cover for protection against ingress of moisture.

**3.6 Storage**

Components and kits shall be capable of being stored without deterioration in an ambient air temperature 5°C to 50°C when protected from direct sunlight.

**3.7** **Inspection and testing**

All materials covered by this Specification shall be subject to inspection and test by the Authority during manufacture and before final dispatch from manufacturer's works. The approval of the Authority of any such inspection or test will not, however, prejudice the right of the Authority to reject the materials or any part thereof, if it does not comply with the specification when erected or does not give complete satisfaction in service. The contractor shall make available to the Authority for the inspection and testing all required personnel and offer facilities (equipment, testing instruments etc.) at no cost to the Authority. The Authority may, however, use his own instruments and apparatus as a check.

Before any part of the jointing materials is packed or dispatched from the manufacturers works, all tests called for are to have been successfully and satisfactorily carried out in the presence of the Inspector and a certificate issued to that effect by the Inspector in writing.

Adequate notice is to be given when any part of the jointing materials is ready for inspection or test and every facilities of is to be provided by the Contractor and his sub­contractors to enable the Inspector to carry out the necessary inspection and witness the tests. Duplicate copies of all principal Test Records and Test Certificates are to be supplied to the Inspector for all tests carried out in accordance with the provisions of this specification.

The jointing materials and all component parts thereof are to be fully tested in accordance with the provisions of the latest relevant standards as stated in paragraph 2.0 of this Specification or as may be agreed in writing with the Inspector. Test Certificates are to be forwarded to the Purchaser together with the invoices.

**3.8 Service experience**

Bidders shall provide evidence proving that they have satisfactory experience of at least 10 years in the design and manufacturing of jointing accessories for electric cables, 5 of which must be for the type of accessories offered.

In addition, Biddersshall meet the requirements of the relevant clause "Documents Establishing Goods conformity to Tender Documents" of the relevant section of the Tender Documents.

**3.9 Accelerated laboratory tests**

The following requirement is additional to the requirements of the Specification, and if met will benefit the tenderers for Evaluation of the Tender Documents.

Proof of accelerated laboratory test and long term field usage to confirm the retention of the properties of the materials within permissible limits under variations of temperature and thermal ageing must be submitted with Tender.

3.10 Samples

Tenderers are required to submit with their tenders samples of the kits offered as to be delivered in case of order. The kits shall include the installation instructions.

Tenders without samples shall not be considered. The samples shall be returned to the tenderers, after the award, at their own expenses.

3.11 Training

Tenderers are required to provide training for TGSPDCL staff and also to the available outsourced cable jointers for at least 10 man days in phase wise over the period of the contract, at dates that will be decided at a later stage. All expenses i.e trainers wages, living expenses. Training materials i.e., cables and jointing materials shall be provided by shall be covered by the Tenderer.

**4.0 TECHNICAL REQUIREMENTS**

The technical requirements described below refer to heat shrinkable, elastic and moulded products (separable connectors).

4.1 **Design and Technology**

Product design shall be based on the use of heat-shrinkable or elastic tubings and moulded parts to provide for the functions of high voltage insulation, electrical stress control, electrical screening, sealing and environmental protection as necessary. The use of tapes to provide primary insulation, screening or primary stress control is not acceptable.

Tenderers shall submit evidence with their tenders that designs are based on sound engineering principles, accumulated know-how and satisfactory service experience.

Design shall aim at minimizing the number of component parts and the time and skill required for satisfactory installation.

For joints single anti tracking tube design is required, which shall provide both anti tracking and stress control grading.

Anti-track and weather-resistant tubing shall be used in outdoor terminations in all positions where the material surface is subject to electrical stress. Mastics or adhesives used as sealants for these tubings must be similarly anti-track and weather-resistant.

All necessary sealants shall be provided pre-coated on the internal surfaces of tubings and moulded parts. Sealant surfaces shall be protected by release paper as necessary.

Screening of conductor connectors shall be achieved with *single* co-extruded dual wall tubing/Tripple wall tubing comprising an inner insulating layer and an outer conducting layer. Separate or additional insulating and conducting tubings are not acceptable. The insulating layer shall provide an insulation thickness at least 30% more than the cable insulation.

4.2 **Lugs and connectors**

4.2.1. Mechanical **shear bolt type**

Mechanical shear bolt type connectors shall be used as follows:

They shall have the following characteristics/features:

1. They shall be in accordance with EN 61238-1.
2. Connectors shall be of the water block type, and the shear bolt heads to be hexagonal.
3. Lugs on aluminum cores shall be provided with oxidation inhibiting compound, or any other approved means for inhibiting oxidation.
4. Bolts of the shear bolt type shall be suitable for M12 bolt

**4.3. Installation Instructions**

Detailed installation instructions with drawings for all joints and terminations offered, including all parts, shall be provided with the tender documents in English language. The successful tenderer shall provide installation instructions in English language.

4.4 **Component types**

For heat shrinkable materials:

1. The tubing components (such as internal insulating tubing, stress control

tubing, anti-track tubing, external protective tubing) shall conform to the

requirements given of EA TS 09

The moulded components shall conform to the requirements given in List 2 of EA TS 09-13.

1. The sealants shall conform to the requirements given in List 3 of EA TS 09-13 and EA TS 09-11.
   * 1. Specific requirements for components

Electric stress control for the cable insulation screen ends and over the connectors shall be achieved by tubings.

The stress control material shall have defined impedance characteristic, volume resistivity, and permittivity (dielectric constant). The AC impedance shall remain constant despite of thermal ageing, which will take place due to heating effect within the conductor and the temperature of the environment.

Tenderers must submit:

1. Documentary evidence including graphs showing the effects of temperature and thermal ageing on the impedance of the stress control material offered.
2. A technical explanation as to how the correct electrical properties of the material Vs volume resistivity, permittivity and AC impedance, have been derived
3. The recommended lengths of the stress control material.

(d)Proof of accelerated laboratory and long term field usage to confirm the retention of the properties within permissible limits under variations of temperature and thermal ageing.

4.4.1.2 Non tracking erosion and weather resistant, insulating tubing and moulded parts

Tenderers must provide proof of weather and track resistance of the polymeric material offered, through actual field studies or through accelerated laboratory studies, to confirm a minimum of 30 years expectancy.

This should include:

1. Thermal Endurance - An Arrhenius plot to confirm the life expectancy on continuous exposure at 90° C.
2. Tracking and Erosion Resistance Test to prove the withstand ability against effects of surface electrical leakage currents.
3. Weathering Data properties.

4.4.1.3 Track Resistant Sealant is (Insulating and Weather Resistant)

Sealing of the interfaces between components subject to electrical stress shall be achieved by using a track resistant sealant or a hot melt adhesive. This sealant/adhesive shall be pre-coated inside the shrinkable components. Tenderers must provide the following information:

1. The adhesive peel strength the sealant provides between Non tracking tubing and non trackingmoulded part.
2. The dielectric strength, tracking and erosion resistance of the sealant as per ASTM D2303.

4.4.1.4 Dual Wall/Tripple wall co, extruded Tubing

Tenderers must submit:

(a) Proof that the dual/Tripple wall tubings are manufactured by means of co extrusion..

* Proof of accelerated laboratory and long term field usage to confirm the retention of key properties within permissible limits due to thermal ageing. Minimum key properties before and after ageing to be stated.
* Confirmation of the minimum thickness of insulation provided over the

connector for the maximum size of conductor for which the tubing is supplied.

The insulation layer shall provide an insulation thickness at least 30% more

than the cable insulation.

4.4.1.5 Void Filling, Stress Relieving Mastic

Tenderers must submit:

(a) Data of the stress relieving mastic, which should include information on the volume resistivity, and permittivity.

The mastic shall provide a void free interface between the stress control layer and the cable insulation as well as the connector and Proof of long term usage in the field to confirm satisfactory performance.

**4.5. Specific Requirements for Joints.**

**4.5.1 General requirements for joints.**

4.5.1.1 External leakage insulation between the live conductor and earth potential using

anti-track and weather resistant material.

4.5.1.2 Electrical stress control using electrical stress control material over the cores.

4.5.1.3 Hermetic sealing of the interfaces between the cable accessory and cable

surfaces, bushings or cable lugs by use of track resistant adhesive/sealant.

4.5.1.4. Detail technical characteristics wrap around sleeve if offered must be provided.

4.5.2.4 Outdoor termination kits shall provide means for protecting the exposed insulation of the conductors from UV radiation.

**5.0 TESTS**

5.1 **TypeTests on Components**

The Tenderer shall submit with the tender documents test certificates to prove that shrinkable or elastic or moulded components, lugs and connectors used for cable joints and termination kits comply with the performance specification as indicated in HD629.1 S2, EA TS 09-11 and EATS 09-13. Test certificates shall be submitted with the tender documents.

**5.2 Routine Tests on Components**

Tenderers must submit with their tenders routine tests certificates as per the requirements of EA TS 09-11 and EA TS 09-13.

In addition, during the acceptance testing of the first and any other subsequent consignment, components will be randomly selected by the Inspector from jointing kits and will be subjected to the following routine and type tests, at CPRI.

The cost of testing shall be inclusive of all tests specified at CPRI in the bid cost.

Visual examination

1. Dimension
2. Flame Retardance
3. Packing and markings.

**5.3 Type Tests on 33 kV Joints and Terminations**

The Tenderers are required to submit with their Tenders the type test certificates mentioned in the following paragraphs, for each type of cable Joint or Termination. For testing, the test specimen shall be mounted on a cable similar with that intended. Parts and accessories (e.g., connectors) included in the design/supply that can affect the test result shall be installed. For tender purposes, the type tests must have been carried out by using mechanical connectors.

In addition, during the acceptance testing of the first consignment, Joint and Termination kits will be selected on a random basis by the Inspector and the following tests shall be repeated on cables provided by the Authority, at his presence, and tests certificates shall be issued by the Manufacturer. Thermal cycle and salt fog tests can be waived at the discretion of the Inspector, provided that test certificates issued by a reputable and internationally recognized Testing Body are presented.

In addition during the acceptance testing of the first and any other subsequent consignment, joint/termination kits will be selected on a random basis by the Inspector and the tests described above shall be repeated on cables provided by the Authority, at his presence, and test certificates shall be issued by the manufacturer.

The tests shall be performed using the appropriate type of lugs and connectors, as required in paragraph 7.2 above

**TYPE TEST SEQUENCE FOR JOINTS AND TERMINATIONS:**

**TEST SEQUENCE FOR TERMINATIONS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sr. No | Test1) | Requirements | Test Methods of IS: 13573 Part 3 |  | | | | |
|  | | | |  |  |  |  |  |
| 1 | Conductor resistance |  | Sub clause 4.1 |  |  |  |  |  |
| 2 | AC withstand or DC withstand  AC (wet) | AC for 5 min at 4.5 U0 or DC for 15 min at 4 U0  1 min at 4 U0 2) | Subclause 4.2 or 5 |  |  |  |  |  |
| 3 | Partial discharge | 10 pC max. at 1.73 U0 | Clause 7 |  |  |  |  |  |
| 4 | Impulse at θt3) | 10 impulses of each polarity | Clause 6 |  |  |  |  |  |
| 5 | Heating cycles in air | 60 cycles4) at θt3) and 2.5 U0 | Subclauses  9.1 and 9.2 |  |  |  |  |  |
| 6 | Partial discharge at θt3),5) and ambient temperature | 10 pC max. at 1.73 U0 | Clause 7 |  |  |  |  |  |
| 7 | Thermal short circuit (screen)6) | Two short circuits at Isc of the cable screen. No visible deterioration | Clause 10 |  |  |  |  |  |
| 8 | Thermal short circuit (conductor) | Two short circuits to raise conductor to θscof the cable. No visible deterioration | Clause 11 |  |  |  |  |  |
| 9 | Dynamic short circuit8) | One short circuit at Id.No visible deterioration | Clause 12 |  |  |  |  |  |

**TEST SEQUENCE FOR TERMINATIONS (CONTINUED)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10 | Impulse | 10 impulses of each polarity | Clause 6 |  |  |  |  |  |
| 11 | Conductor resistance |  | Subclause 4.1 |  |  |  |  |  |
| 12 | AC Voltage | 15 min at 2.5 U0 | Subclause 4.2 |  |  |  |  |  |
| 13 | Humidity 9),10) | 300 hrs at 1.25 U0 | Clause 13 |  |  |  |  |  |
| 14 | Salt Fog 2),10) | 1000 hrs at 1.25 U0 | Clause 13 |  |  |  |  |  |
| 15 | Examination | For information only11) | - |  |  |  |  |  |
| 1) Unless otherwise specified, tests shall be carried out at ambient temperature.   1. For outdoor terminations only. 2. θtis the maximum cable conductor temperature in normal operation +5 deg C to + 10 deg C. 3. 8 hrs total with ≥ 2 hrs steady and ≥ 3 hrs cooling. 4. Measurement is made at the end of the heating period. 5. This test is only required for terminations that are equipped with a connection to, or adaptor for, the metallic screen of the cable 6. Thermal short circuit may be combined with the dynamic short circuit. 7. Only required for single core cable accessories designed for initial peak currents ip> 80 kA and three core accessories designed for ip> 63 kA. Value of id shall be declared by the manufacturer. 8. For indoor terminations only. Not required for compound filled terminal boxes. Shrouded terminations shall be tested in a three phase condition. 9. Not required for terminations having porcelain insulators. 10. It is advised that the accessory is examined for signs of any of the following:   - cracking in the filling media and/or tape or tube components.  And/or - a moisture path across a primary seal  And/or - corrosion and/or tracking and/or erosion which would, in time, lead  to failure of the accessory.  And/or - leakage of any insulating material. | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| r. No | | Test1) | Requirements | Test Methods of IS: 13573 Part 3 |  | | |
|  | | | | |  |  |  |
| 1 | Conductor resistance | |  | Subclause 4.1 |  |  |  |
| 2 | AC withstand or DC withstand | | AC for 5 min at 4.5 U0 or DC for 15 min at 4 U0 | Subclause 4.2 or 5 |  |  |  |
| 3 | Partial discharge | | 10 pC max. at 1.73 U0 | Clause 7 |  |  |  |
| 4 | Impulse at θt2) | | 10 impulses of each polarity | Clause 6 |  |  |  |
| 5 | Heating cycles in air | | 30 cycles3) at θt2) and 2.5 U0 | Clause 9 |  |  |  |
| 6 | Heating cycles under water | | 30 cycles3) at θt2) and 2.5 U0 | Clause 9 |  |  |  |
| 7 | Partial discharge at θt2),4) and ambient temperature | | 10 pC max. at 1.73 U0 | Clause 7 |  |  |  |
| 8 | Thermal short circuit (screen) | | Two short circuits at Isc of the cable screen. No visible deterioration | Clause 10 |  |  |  |
| 9 | Thermal short circuit (conductor) | | Two short circuits to raise conductor to θscof the cable. No visible deterioration | Clause 11 |  |  |  |
| 10 | Dynamic short circuit6) | | One short circuit at Id.No visible deterioration | Clause 12 |  |  |  |
| 11 | Impulse | | 10 impulses of each polarity | Clause 6 |  |  |  |

**SPECIFICATION OF BAY EXTENSION AT EHT WITH BOOM STRUCTURE**

**Schedule 5- Bay extension works at EHT SS**

The scope of supply includes supply, fixing testing and commissioning of 33 kV breaker at 132/33 kV SS including the cost of breaker etc as detailed below.

* Supply and erection of TC Structures & BD Booms 4 Nos. TC towers (each 578 Kgs), 3 Nos. BD Booms (225 Kgs each) & 1 No. Canti lever 110 Kgs including bolts and nuts.
* Supply & Fabrication & Galvanization of raw steel such as MS Angles, Plates, Channels, RS Joists, MS Rounds etc, and fabrication and galvanisation of main and auxiliary structures stub setting template and foundation bolts 'U' Bolts with suitable galvanized nuts for foundations bolts including cost of steel and transportation to substation site.
* Providing & Fixing galvanized Bolts and nuts including cost of material for erection of tower.
* Erection of main and auxiliary structures.
* Excavation of pit of size 1.6x1.6x1.275 =3.264 Cum X 4 Nos
* Concrete PCC (1:4:8) (1.6x1.6x0.075=0.192 Cum x 4 Nos.
* Concrete RCC (1:2:4) (1.6x1.6x0.3+1x1x1.05=1.818 Cum x 4 Nos.
* Plastering = 1x1x1+4x1x0.15 = 1.6 Sqmm x 4 Nos.
* Back filling (2x0.3x1.6x0.9+2x0.3x1x0.9 = 1.6 Sqmm 4 Nos.
* Reinforcement (RTS) 10mm Dia = 12 Nos x 4.86, 14Nosx3.88 = 73.84 Rmtrx0.62 =45.78 Kgx4Nos.
* Supply, erection and commissioning and testing of 33 KV 25 KA, 3 Sec VCB including Current transformers with 800-400/1-1 A, including the control and Relay panel of 220 V DC.
* Excavation in all types of soils (2.1x1.5x1.1x1.65 ) = 6.5 cum.
* Cement concrete PCC (1:4:8) = 2x1.5x1.1x0.1 = 0.33 cum.
* RCC (1:2:4) = 2x1.5x1.1x0.3 + 2x0.5x0.9x(1.2+0.35) = 4.34 cum.
* Smooth plastering of VCB plinth (0.5x0.9+2x0.35x0.9+2x0.35x0.5) = 2.23 Cum.
* Back filling 6.5 - 4.67 = 1.83 cum.
* Reinforcement (RTS) 10mm Dia = 16 Nos x1.4x4+10 Nosx1x4=129.60 Rmt.=129.62x0.62 Kgs=80.352 Kgs.
* Supply and Jumpering with Zebra conductor from A.B Switch to breaker,breaker to C.T. and C.T to A.B Switch.(total 9 jumpering locations).
* Supply &erection of 33KV 800 A AB switch fixing of guide pipes and alignment, Jumpering of AB Switch, earthing with M.S Flat cutting to size and making holes and spot welding and complete including cost of bolts & nuts.
* Supply & Erection of 33KV LAs With Bolts and nuts and fixing of guids with clamps, on structure, jumpering and earthing of LAs' with M.S flat (including cutting to size, making holes and spot welding).
* Supply & Laying of earth mat including excavation of trenches, welding and fixing lugs, connecting to equipment and connecting lighting shield to earth mat and earthing of fence posts, drilling and connecting earth rods including connecting cast iron pipes as per Drg. No. SET(P) 149/82 with the following sizes of MS/GI Flats including supply of MS Flat and GI Flat with 100 x 16mm MS Flat, 100 x 16mm GI Flat, 50 x 8mm MS Flat, 50 x 8mm GI Flat.
* Supply of Earth Electrode & Excavation of earth pit, putting cast iron pipe with flange on one end of nominal dia" 125mm and 2.75 mtrs long inside the pit including supply and fixing RCC collar 4 mtrsdia" and 0.6 mtrs length inside the pit backfill the pit with mixture of Bentonite and Black cotton soil and earth of 300mm thick around the earth pipe of 150mm on all the sides of the pipe including cost and conveyance of BH coke and RCC collars, labour charges for all operational and incidental items of work etc., complete but including cost of CI pipes.
* Supply & Erection of twin control & relay panel in the Control Room duly maintaining them on channels and grouting them with foundation bolts including cost of channels and foundation bolts.
* Supply and Laying of control cables of all sizes from 2 Cx2.5sqmm copper control cable trenches including running of cables in control room when cable are run on cable racks in cable duct.
* Supply and Laying of control cables of all sizes from 4 C x2.5sqmm copper control cable trenches including running of cables in control room when cable are run on cable racks in cable duct.
* Supply and Laying of control cables of all sizes from 10 C x2.5sqmm copper control cable trenches including running of cables in control room when cable are run on cable racks in cable duct.
* Supply of ACSR Zeebra Conductor.
* Connecting equipment to bus and/or another equipment including measuring, cutting, clamping and hosting of suspension insulators assembly to support the conductor with twin/single zebra and other items of work, With Single Zebra without PASD, With Single Zebra with PASD with Twin Zebra without PASD.
* Hoisting of insulators and hardware stretching of 33KV Auxiliary Bus comprising three conductors with twin zebra conductor to a tension of 900 Kgs. Including fixing of spacer clamps, 3-bolted tension hardware for twin zebra with Twin zebra spacer clamps, T clamps for twin Zebra, Tension clamps for twin zebra, pad clamps.
* Supply Erection of Marshalling boxes on the structures of equipment in full shape including cost of marshalling boxes.
* Cable termination to the Switchgear, marshalling boxes/panel terminal blocks/control and relay panels, LTAC panel, including cost of suitable ferrules and lugs each on at both ends.
* Supply & Erection of Tubulor Poles (30 feet Hegit) For yard Lights.
* Installation of lighting fixtures on switchyard structures including cost of lighting fixtures of Metal halide 150W/LED 100 and cabling and connections complete.
* Supply & Provision of Earth bonds including cost of Earth bonds.
* Cable ducts for laying of power & control cables for Switch yard, Control Room, Earth excavation & removing of earth boulders & leveling of the yard of the yard in the following soils, Red earth or hard gravel soil, Removing of Hard rock boulders by bendhin, chisselling, wedging and boring in rock in foundation complete for finished item & cleaning the removed boulders away from the site,
* Metal Spreading in the Yard with 20 mm Metal

SPECIFICATION OF K, L, M TOWERS

**Erection of Towers** / **Sub-Station Structures**

* During erection of towers only the minimum' number' of workers shall be deployed to minimize risks of objects falling on workmen especially when work is carried out at two or more levels of towers or structures. The workmen shall invariably use safety devices such as helmets and safety belts during erection of towers and sub-station structures.
* Tie ropes shall be used wherever necessary for holding steel sections or tower parts in position.
* The devices such as pulley blocks and wire ropes, used for erection of towers structures shall be of good quality and shall \*be tested. They shall be inspected by experienced officers before use.
* During erection of towers using hoisting equipments such as cranes and tripartite adjacent to existing transmission lines, the lines shall be de‑energized wherever possible. When this is not possible special precautions shall be taken to maintain minimum clearances from live lines
* Whenever cranes or tripartite are used for erection, they shall be set on firm foundations / level ground. The wheels of ‘mobile machines shall be in locked position to prevent dislocation during operation.
* Tie ropes shall be used to maintain control of tower sections being raised and positioned wherever possible. Care shall be taken to prevent the ropes from creating hazards themselves.
* Erection or maintenance shall not be carried out during high velocity wind, heavy rainfall and thunderstorms.

Precautions pertaining to traffic control shall be taken during work including at highway crossings and railway crossings.

SECTION -6

**SAFETY MEASURES**

The Contractor shall maintain safety tools and materials as per the work to be carriedout.

TGSPDCL is not liable for any accident or untoward incident during the execution of work.

**Warnings Signs**

Different types of warning signs such as "Men working", "Line under permit to work", "Danger", etc and other indications for earthing, live parts, shock hazard possibility etc are to be displayed at strategic points by the contractor.

The contractor shall utilize the safety material as detailed during the execution of work.

**Rubber Gloves**

These are specially processed gloves, high dielectric strength, hardened as required and with flexibility for normal bend of fingers and thumbs for operating equipment handles.

**Work Gloves**

These are gloves made of silicon grain leather, flexible and with large protective cuff. These gloves are used while working on equipment for pre-commissioning tests or for repairs.

**Polyethylene helmets**

Safety hats for industrial and construction use, with tough outer shell, brims to allow water to drain and with adjustable side ventilation, in standard sizes.

**Insulated boots**

These are boots made of special leather with elastomeric canvas support, flexible with anti-slip sole.

**Safety Unit**

Safety clothing, include safety suit with no metal parts, resistant to wear and tear, flexible comfortable with Velcro straps.

**Hooded Rain Coat**

PVC rain garment with matching nylon trousers for the use of the workmen during rains.

**Reinforced Safety Belt**

These are waist belts for use in the overhead line work, with polyamide or leather elements, cast steel buckles suspension rings, straps, fiber ropes etc. Anti-fall safety-snaps will also be part of the safety belt.

**Portable lamps’**

In the safety tools of workmen, head lamps, pocket torch, hand lamps etc are also included.

**Life saving Kits**

These shall contain, voltage detectors, cable cutter with insulated handles, insulated platform on ladder and rescue sticks.

**Fire Extinguisher -**

Normally CO2 cylinder 4.5'\*g, 6.5 kg, 9 kg, 22 kg are used in sub-stations and generating stations. 22 kq•scylinders are generally trolley mounted type.

The work area shall be separated from all possible sources of supply of power, by ensuring relevant circuit breakers, isolating switches etc.

The equipment like breakers and isolators shall be locked in the open condition.

1. Warning boards shall be exhibited even during the simple temporarymaintenance operation,
2. The area of work shall be properly demarcated with identifying ribbons or ropes.
3. Each conductor or apparatus shall be checked to ensure absence of voltage.
4. Proper short circuit and earthing shall be made before commencing any work on the line or equipment.

All safety rules given above and other associated guide lines are for enhancing safety when a person is in contact with or in close proximity to an electrical network. Using proper ladders, safety belts, helmets, insulating gloves etc form part of the safety rules, as observation of the same are essential for preventing accidents other than the electrical shock hazard.

**Safety Checks**

The safety checks include the following

1. Whether the worker is properly trained for the work and aware of safety rules?

ii) Whether appropriate tools, and gadget available for the work? ***AN%***

iii) Whether the' person is properly insulated by using insulated platform, gloves, mats etc.?

iv) Whether the active or live conductors are away at a safe distance?

v) Whether safety equipment like helmets, safety belts, fire fighting equipment, earth rods etc. available?

vi) Whether all accidental reconnection of supply or induced voltage possibilities are guarded against?

vii) Whether life saving kits and first aid equipment available?

**Safety Measures during erection of lines and installation of Equipment 3.5.1 Excavation for Foundations.**

• The excavation for pad or pile type foundations in excess of 1.5 meters depth located on unstable earth shall be either sloped to the angle of repose or shored if entry is required., Ladders shall be used for access to pad or pile type footing excavations in excess of 1.2 meters.

Workmen shall not enter excavated pit in un-stable earth unless shoring is used to protect them.

* Workmen shall not remain in the excavated pit where concreting is done using machinery.
* Mobile machines for concreting shall be located only on leveled earth to ensure stability.

SECTION-7

**BILL OF QUANTITIES**

# A. PREAMBLE

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Technical Specifications and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable and otherwise at such rates and prices of the Engineer may fix within the terms of the Contract.
3. The rates and prices tendered in the priced Bills of quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, labour, supervision, materials, erection maintenance, insurance, profit, taxes and duties, together with all general risk, liabilities land obligations set out or implied in the contract.
4. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related items of work.
5. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering prices against each item in the price Bill of Quantities.
6. The method of measurement of completed work of payment shall be in accordance with relevant I.S.S Codes.

Rock is defined as all materials which, in the opinion of the Engineer require blasting, or the use of metal wedges and sledge hammers, or, the use of compressed air, drilling for its removal, and which cannot be extracted by ripping with a tractor at least with 150 brakes H.P with a single rear mounted heavy duty ripper

#### SECTION 8

##### FORMS OF SECURITIES

Acceptable forms of securities are annexed. Bidders should not complete the performance forms at this time. Only the successful bidder will be required to provide Performance Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

**Annex A:** Bid Security (Bank Guarantee)

**Annex B:** Performance Bank Guarantee

**BID SECURITY (BANK GUARANTEE)**

###### ANNEXURE – A

Whereas \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of Bidder)(here in after called “the Bidder”) has submitted his bid dated \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (date) for the Erection of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of Contract) hereinafter called “the Bid”).

Know all people by these presents that We \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of bank) of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of country) having our registered office at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (hereinafter called “the Bank” are bound unto \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name of Employer) (hereinafter called “the employer”) in the sum of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

SEALED with the Commission Seal of the said Bank this \_\_\_\_\_\_\_\_\_\_\_\_ day of 2011.

The conditions of this obligation are:

1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid.

1. If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid Validity.
   1. Fails or refuses to execute the Form of Agreement in accordance with the instructions to Bidders, if required or
   2. Fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders; or
   3. Does not accept the correction of the Bid Price pursuant to Clause 26.

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date \_\_\_\_\_\_\_\_ 2 days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

Date \_\_\_\_\_\_\_\_\_\_\_ Signature of the Bank \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Witness \_\_\_\_\_\_\_\_\_ Seal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Signature, name and address)

1. The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions of Bidders.

45 days after the end of the validity period of the Bid. Date should be inserted by the Employer before the Bidding documents are issued.

**PERFORMANCE BANK GUARANTEE**

**ANNEXURE – B**

To: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Name of Employer)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Address of Employer)

Whereas \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Name and address of Contractor) (hereinafter called “the Contractor”) has undertaken, in pursuance of Contract No. \_\_\_ dated \_\_\_\_\_\_\_ to execute \_\_\_\_\_\_\_\_\_\_\_\_ (name of Contract and brief description of works) (hereinafter called “the Contractor”).

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract:

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of \_\_\_\_\_\_\_\_\_\_\_\_ (amount of guarantee) 1 \_\_\_\_\_\_\_\_\_\_\_\_\_ (in words), such sum being payable in the payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavel or argument, any sum or sums within the limits of \_\_\_\_\_\_\_\_\_\_ (amount) of guarantee) 1 as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contractor or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 28 days from the date of expiry of the Defects Liability Period.

Signature and seal of the Guarantor \_\_\_\_\_\_\_\_\_\_\_

Name of the Bank \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Address \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.