**SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LTD**

**BIDDING DOCUMENT**

Invitation to Bidders



## **DISTRIBUTION COMPANY OF TELANGANA LTD**

**LIGHTING UP YOUR LIVES**

SOUTHERN

POWER

**Specification No. DE/ Master Plan/ WCGH Division/RR/ T.Sp. No. 3/2023-24**

"Providing alternate source of supply to 33/11KV Mayurinagar SS from 132/33KV Bollaram EHT SS with erection of 0.3KM of 33KV interlinking line to 33KV KPHB feeder duly tapping near Divya Shakti Apartment and extending up to 33/11KV Mayurinagar SS of Operation section Hydernagar of Kukatpally Operation Sub-division & Division of Medchal Circle and work executed by Masterplan WCGH Rangareddy Sub-division & division of Masterplan Rangareddy Circle under T&D Improvement to original works".

SCHEDULE COST: RS. 590/-

Date, Time, Place of opening of Tender is on: 01.02.2024 at 15:00 Hrs in Chambers of Divisional Engineer/ Master Plan/WCGH Division/ RR Circle

Sold to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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DD No. Rs. Date:

Bank: Branch:

Tenderer 1



**SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED**

Master Plan/WCGH Division/ RR Circle, Kukatpally, Hyderabad

**Proceeding No. DE/ Master Plan /WCGH Division /RR Circle / F.No.Spc No.03/2023-24 / D.No. 284/2023-24, Dt:25.01.2024 .**

Sealed Tenders are invited from the eligible contractors for the following work up to **01.02.2024** at **13:00** Hrs. The tenders will be opened on **01.02.2024** at **15:00** Hrs in the presence of the Divisional Engineer /Master Plan/WCGH Division/RR Circle and tenderer or their authorized representatives in the O/o Divisional Engineer /Master Plan/WCGH Division/RR Circle/Kukatpally, Hyderabad.

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| **S.No** | **Specification No.** | **Name of the work** | **Approx. Value of work Rs.** | **EMD (2%) to be paid Rs.** | **Period of completion** |
| 1 | Spec No. 03/2023-24 of DE/ Master Plan/WCGH Division/RR Circle | "Providing alternate source of supply to 33/11KV Mayurinagar SS from 132/33KV Bollaram EHT SS with erection of 0.3KM of 33KV interlinking line to 33KV KPHB feeder duly tapping near Divya Shakti Apartment and extending up to 33/11KV Mayurinagar SS of Operation section Hydernagar of Kukatpally Operation Sub-division & Division of Medchal Circle and work executed by Masterplan WCGH Rangareddy Sub-division & division of Masterplan Rangareddy Circle under T&D Improvement to original works" | 501410/- | 10029/- | 4 months |

|  |  |  |
| --- | --- | --- |
| 1 | Date of sale of bid | 25.01.2024 at 11:00 Hrs |
| 2 | Last Date for sales of tender schedule | 31.01.2024 at 16:00 Hrs |
| 3 | Last date of receipt of tenders | 01.02.2024 at 13:00 Hrs |
| 4 | Date & Time of opening of tenders | 01.02.2024 at 15:00 Hrs |
| 5 | Cost of tender specification | Rs. 590/- |
| 6 | The Cost of tender Specification and EMD shall be remitted by the way of Demand Draft drawn in favour of Accounts Officer, Master Plan, TSSPDCL, Hyderabad | |

Any further information in this regard can be obtained from this office the Divisional Engineer/ Master Plan/WCGH Division/RR Circle, TSSPDCL. Hyderabad and from the website of [**www.tssouthernpower.com**](http://www.tssouthernpower.com)

Sd/-

**Divisional Engineer Electrical,**

**Master Plan, WCGH,**

**RR, Kukatpally,**

Phone/Fax : **9491045256 TSSPDCL, Hyderabad.**

Tenderer 2

**Each bidder should submit the following documents in the bid.**

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| 7 | **Eligibility Criteria**  **Mandatory** | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **SI. No.** | **Description** | | | | | 1 | **Financial Turnover:**  As part of financial eligibility, the bidder should have achieved a minimum turnover of 50% of Bid value during any one financial year in the preceding **Seven** financial years i.e., **FY2016-17 to FY:2022-23** certified by Chartered Accountant. | | | | | 2 | **Technical 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 last 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. | | | | | a | UG Cable | | 33kV | 25% of the route length must be executed in any consecutive 24 months period during preceding Seven financial years. | | 11kV | | b | OH Line | | 33kV | 25% of the route length must be executed in any consecutive 24 months period during preceding Seven financial years. | | 11kV | | c | Towers | | M-Type | 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. | | 3 | The Contractor shall have valid ‘A’ Grade Electrical Contractor’s license from CEIG, Government of Telangana up to 33 kV or above voltage grade. | | | | | 4 | Valid bid security @ 2 percent of ECV in the form of DD only drawn in favour of Accounts Officer/ Master Plan/ TSSPDCL/ Hyderabad from any Scheduled Bank or Nationalized Bank only.  **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** | | | | | 5 | Copy of Liquid Assets/ Solvency Certificate for not less than 20% of Bid value and should have been issued by any Scheduled bank or Nationalized bank not earlier than Twelve Months prior to the date of bid opening. The TSSPDCL reserves the right wherever necessary to make queries with the bidders bankers | | | | | 6 | Bidder should submit a Copy of TSSPDCL Registration of the Vendor | | | | | 7 | The bidder has to submit the Goods and Services Tax (GST) and EPF & ESI Registration Certificates. | | | | | 8 | The bidder should upload the information of Litigation History on letter head. | | | | | 9 | 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 the work or Specification no. of the bid. | | | | | 10 | Declaration certificate shall be given on Firm’s letter head duly certifying the availability of critical equipment either owned or leased (i.e. Owned equipments and leased equipments should specifically be mentioned) shall be mentioned separately such as Rollers, Tractors, JCBs, Cranes, Ropes and Pullies, safety equipment with first aid kit, Meggar, Tong tester, UG Cable length measuring equipment, 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. **Bidders without giving declaration for Cable Rollers & Pulling machines will be summarily rejected as the cable work must be carried out using rollers only.** | | | | | 11 | Bidder should submit declaration of Qualification of key person/Site in charge with  B.Tech/ Diploma in Electrical Engineering from Recognized Universities | | | | | **SI.No.** | | **Description** | | | | 1 | | Pan Card | | | | 2 | | Firm Registration/ Registered Partnership deed in case of firm | | | | 3 | | EPF Registration Certificate | | | | 4 | | The bidder is requested to furnish Email address for correspondence | | | | 5 | | The Bidder should submit the hard copy of all uploaded mandatory documents for verification | | | | 6 | | The Bidder shall submit a copy of financial turnover, Profit & Loss statements, Balance sheets and Income tax return statements supporting the Financial Turnover in the preceding Seven financial years certified by Chartered Accountant. | | | |
| **Optional** |
| 8  8 | All tenders must be accompanied by the bid security shall be delivered to the following address the Divisional Engineer /Master Plan/WCGH Division/RR Circle/Kukatpally, Hyderabad. | |
| 9  9 | The under signed reserves the right to reject any or all tenders without assigns any reasons thereof. | |
| 10 | Procedure for Bid Submission | 1. The bidders are requested to submit all the Mandatory Documents duly attested by the Gazetted Officer as stipulated in the bid document. 2. Hard Copies shall also to be submitted with all above mentioned documents only in sealed bid on or before **01.02.2024** **at 13:00 Hrs** to make him responsive, subject to fulfillment of other required obligations of the bid document. 3. The department shall not be responsible for any risk on account of postal delay, similarly, if any of the certificates, documents, etc., furnished by the bidder are found to be false misleading/ fabricated/ bogus, the bidder will be disqualified duly forfeiting the bid security & black listed and action will be initiated as deemed fit. | |
| 11 | Right reserved with the Department | TSSPDCL reserves the right to accept or reject any or all the bids received without assigning any reasons there for. | |
| 12 | General Terms and conditions | As specified in the bid document and TSSPDCL terms & Conditions. | |

Tenderer 4

Technical specification :

**SCOPE**:

The scope of this specification is intended for laying of Under Ground Cable.

Total works covered are as per details given below:

- "Erection of interlinking line for alternate source to 33/11kV SS Mayuri nagar by tapping on 33kV KPHB feeder which is emanating from EHT Bollaram in operation division Kukatpally in Masterplan Sub-division-1 of WCGH division of RR circle".

**LAYING AND INSTALLATION**

**1. CABLE LAYING (33/11 kV)**

1.1 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

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.

1.2 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.

1.3 As applicable for 33 kV 1 Core 400 sqmm

**2.** **TRENCHING**

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.

**3. 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 coloured 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 levelled flat and free from any object, which would damage the cables. Any gradient encountered shall be removed.

**4. 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

**5. 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.

**6. 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 or agents.

- At places where the cables cross private roads, gates of residential houses or buildings, the cables shall be laid in RCC hume pipes.

**7. 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.

**8. 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 :1.20 meter

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.**

**9. 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.

**10. 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.

**11. FLAKING**

The cables shall be flaked and left with slight extra lengths at jointing bays for expansion and flexibility.

**12.** Sand Bedding shall be provided as detailed in section 4.11 and no special thermal back filling is required.

**13. BACK FILLING**

Normally back filling shall consist of the material earlier excavated. However, bigger stones or pieces of rock should be removed.

**14. 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.

**15. 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.

**16. FOOT PATH CUTTING**

The slabs, kerb stones, on the roads/ footpath shall be removed and reinstated without damage.

**17. 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 TSSPDCL.

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 tarredmacadam, resurfacing may be done by the civic authorities against payment of the restoration charges to be made by the contractor.

**18. 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 TSSPDCL

**19. 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.

**20. 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.

**21. JOINTING AND TERMINATION OF CABLES**

**22. 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/boredor 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 substructures 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.

**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 (TSSPDCL) 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 embarkment 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 finalisation of the route, the Contractor shall submit proposals for way leaves and right of way to TSSPDCL 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:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl.No** | **Voltage** | **Tree Clearance Required** | **Relaxation** |
| 1. | LT | All growth with in 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 with in 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 with in 6.1 mts on either side of the ine 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, TSSPDCL 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 with in 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.

TSSPDCL 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 TSSPDCL 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)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.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)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.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 foreseable future. |

**Special Note:**

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

U.G.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 (Transco) |

**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 mts 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 atleast 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 when ever 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 energised 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 Nos hexogonel 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.

**13.6 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 aluminium 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 aluminium 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 powerline 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 TSSPDCL 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 accertained 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**

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **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 prenumbered 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.

Anticlimbing 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.

**19.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 galvanised 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 Nos aluminium 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 Transco.

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 TSSPDCL staff must make a final check of the complete line, after the contractor confirms that he has carried out all the checks required for energising 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 & tel comm 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 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**22A 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 AP) 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 labourers, at site of work. The TSSPDCL 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.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Erection of interlinking line for alternate source to 33/11kV SS Mayuri nagar by tapping on 33kV KPHB feeder which is emanating from EHT Bollaram in operation division Kukatpally in Masterplan Sub-division-1 of WCGH division of RR circle"."** | | | | | | | | |
| **2. WBS No. T-2331-13-04-01-01-002** | | | | | | | | |
| **Schedule** | | | | | | | | |
| **Sl.No** | QTY | **PARTICULARS** | **Work Type** | **Item Short Description** | **SWR No/APSS/Morth cl.No** | **Rate (INR) (Upto 2 Decimals)** | **UOM** | **Amount** |
| 1 | 2.00 | Errection of 11M long PSCCpole | Elecy | Labour | SWR10978 | 4,336.85 | EA | 8,673.70 |
| 2 | 4.00 | Erectionof9/10/11Meter Boxpole | Elecy | Labour | SWR11266 | 2,643.83 | EA | 10,575.32 |
| 3 | 6.00 | EXCAVOF PITHARD 0.75Mx0.9Mx1.95M | Elecy | Labour | SWR10113 | 1,326.00 | EA | 7,956.00 |
| 4 | 150.00 | Lay-DR 33KV3x400sqmmUGCbHG/BC/CC/BT | Elecy | Labour | SWR11972 | 749.00 | M | 1,12,350.00 |
| 5 | 150.00 | Lay-2ndCable inExcavatedTrench | Elecy | Labour | SWR10988 | 204.10 | M | 30,615.00 |
| 6 | 30.00 | Raise-DR 33KV 3x400sqmmUGCbonsupport | Elecy | Labour | SWR12004 | 323.85 | M | 9,715.50 |
| 7 | 2.00 | Straight throughjoin t33kv3x400xlpe | Elecy | Labour | SWR10382 | 5700.78 | EA | 11,401.56 |
| 8 | 5.00 | OD/Idoor endtermination33kv3x400xlpe | Elecy | Labour | SWR10387 | 2764.76 | EA | 13,823.80 |
| 9 | 3 | S-CIPipeearthing 100mmdia2.75mlong | Elecy | supply | SMR11482 | 3486 | EA | 10,458.00 |
| 10 | 3 | ERECT.OF LINES-Providing ofRCCcollar | Elecy | Labour | SWR10359 | 386 | EA | 1,158.00 |
| 11 | 3 | ERECT.OF LINES-Providing ofearthing | Elecy | Labour | SWR10357 | 1,234.20 | EA | 3,702.60 |
| 12 | 1 | ABSwitchCoilEarthing GINo.8 Wire | Elecy | Labour | SWR12331 | 146.63 | EA | 146.63 |
| 13 | 1 | Painting ABswitchOProdswithPOred | Elecy | Labour | SWR10881 | 142 | EA | 142.00 |
| 14 | 3 | SupTclampLM6Al alloy of12mm,800A | Elecy | supply | SMR40011 | 299 | EA | 897.00 |
| 15 | 3 | Labour for Fixing ofalltypesofclamps | Elecy | Labour | SWR10917 | 65 | EA | 195.00 |
| 16 | 6 | Numbering ofpolesincl.costofpaint | Elecy | Labour | SWR10378 | 32 | EA | 192.00 |
| 17 | 1.00 | LOADINGof33KVAB SWCHCon400/800A | Elecy | Labour | SWR10239 | 126.00 | EA | 126.00 |
| 18 | 1.00 | UNLOADINGof33KVABSWCHCon400/800A | Elecy | Labour | SWR10557 | 79.00 | EA | 79.00 |
| 19 | 1.00 | Erectionof33kv ABSwitchinclearthing | Elecy | Labour | SWR10392 | 4,500.00 | EA | 4,500.00 |
| 20 | 8.00 | LOADINGofR.S.Joists175x85mm | Elecy | Labour | SWR10204 | 76.00 | EA | 608.00 |
| 21 | 8.00 | UNLOADINGofR.S.Joists175  x85mm | Elecy | Labour | SWR10522 | 50.00 | EA | 400.00 |
| 22 | 0.45 | LOADINGofMS  Channel,Angles,Flats&Rods | Elecy | Labour | SWR10206 | 221.00 | TO | 99.45 |
| 23 | 0.45 | UNLOADINGofMS  Channel,Angles,Flats&Rod | Elecy | Labour | SWR10524 | 185.00 | TO | 83.25 |
| 24 | 2.45 | TRANSPORTOF STEEL10TO20KM | Elecy | Labour | SWR10132 | 412.08 | TO | 1,009.60 |
| 25 | 4.00 | Fabricationof175x85/150x75mmRSjoist | Elecy | Labour | SWR10642 | 512.55 | EA | 2,050.20 |
| 26 | 2.45 | SupMaterial for 1stcoatAl.Painting. | Elecy | supply | SMR40009 | 2,181.00 | TO | 5,343.45 |
| 27 | 2.45 | SupMaterial for 2ndcoatAl.Painting. | Elecy | supply | SMR40010 | 1,293.00 | TO | 3,167.85 |
| 28 | 2.45 | Labour for 1stcoatAl.Painting. | Elecy | Labour | SWR10877 | 851 | TO | 2,084.95 |
| 29 | 2.45 | Labour for 2ndcoatAl.Painting. | Elecy | Labour | SWR10879 | 482 | TO | 1,180.90 |
| 30 | 1.00 | Load-11/33KVXLPEUGCablefor allsizes | Elecy | Labour | SWR11230 | 1,024.00 | DR | 1,024.00 |
| 31 | 1.00 | Unload-11/33KVXLPEUGCableallsizes | Elecy | Labour | SWR11231 | 1,024.00 | DR | 1,024.00 |
| 32 | 1.00 | TransportofCondDrum,VCBs  >30&<50Km | Elecy | Labour | SWR11863 | 4,372.74 | EA | 4,372.74 |
| 33 | 3.00 | LOADINGof11KV,10KALAs  Line type | Elecy | Labour | SWR10265 | 32.00 | EA | 96.00 |
| 34 | 3.00 | UNLOADING of 11KV,10KA  Las Line type | Elecy | Labour | SWR10583 | 32.00 | EA | 96.00 |
| 35 | 1.00 | Erect of 33kv LAstntypein clearthing | Elecy | Labour | SWR10396 | 880.00 | SET | 880.00 |
| 36 | 50.00 | S-GIBolts&Nuts,Washers etc., | Elecy | supply | SMR11488 | 117.50 | KG | 5,875.00 |
| 37 | 10.13 | Massconcreting ofsupportsincl.cement | Elecy | Labour | SWR10356 | 6,579.00 | M3 | 66,645.27 |
| 38 | 0.124 | Coping&Muffing-IronPole | Elecy | Labour | SWR11890 | 3,893.00 | M3 | 482.73 |
| 39 | 1.00 | CADDrawing per poleupto10KM | Elecy | Labour | SWR12104 | 6000.00 | LS | 6,000.00 |
| 40 | 64.00 | S-9"BClassGIpipe7.3mmthck28.8Kg/M | Elecy | supply | SMR40082 | 1,113.00 | M | 71,232.00 |
| 41 | 3.00 | HorizontalCutpointfor 33KVline | Elecy | Labour | SWR10981 | 1,791.12 | EA | 5,373.36 |
| 42 | 1.00 | LOADINGofConductor drums | Elecy | Labour | SWR10191 | 202.00 | EA | 202.00 |
| 43 | 1.00 | UNLOADINGofConductordrums | Elecy | Labour | SWR10509 | 100.00 | EA | 100.00 |
| 44 | 3.00 | Removing andMaking theJumpers | Elecy | Labour | SWR12509 | 64.00 | EA | 192.00 |
| 45 | 3.00 | S&E-SmartRFID marker | Elecy | Labour | SWR25089 | 2745.00 | EA | 8,235.00 |
| 46 | 0.15 | Stringing 100sqmm33/11kvLine3CondSC | Elecy | Labour | SWR10366 | 13856.73 | KM | 2,078.51 |
| 47 | 20.00 | Supply of250mmHumepipeofclassNP3 | Elecy | supply | SMR40077 | 363.00 | M | 7,260.00 |
| 48 | 15.00 | Laying ofearthmat,excavation25x3mm | Elecy | Labour | SWR10921 | 68.00 | RMT | 1,020.00 |
| **Total** | | | | | | | | **4,24,923.37** |
| **18% GST** | | | | | | | | **76486.21** |
| **Total Schedule Amount** | | | | | | | | **5,01,409.58** |

5

FOOT NOTE (Schedule A)

TENDER NOTIFICATION No. Spc No. 03/2023-24 of DE/MP/WCGH Division/ RR Circle

Name of the work: - "Erection of interlinking line for alternate source to 33/11kV SS Mayuri nagar by tapping on 33kV KPHB feeder which is emanating from EHT Bollaram in operation division Kukatpally in Masterplan Sub-division-1 of WCGH division of RR circle".

**Estimated value of contract:- Rs. 501410/-** (Five Lakhs One Thousand Four hundred and Ten Rupees only)

I/ We …………………………………………………………… do hereby

express my/ our willingness to execute the aforesaid work as per the conditions, standards, specifications, rules and regulations etc., stipulated in the Tender Schedules

1) The estimated value of the contract Rs. /- (Rupees ………………………………………………………………………………………………………………………………..only)

(or)

2) An overall tender percentage of *excess over* (in figures …………………….. And in words

…………………………………………………..) the estimated value of the contract.

(or)

3) An overall tender percentage of *less than* (in figures …………………….. And in words

…………………………………………………..) the estimated value of the contract.

(Clearly strike out whichever is not applicable)

Conditions:

1. The percentage quoted shall be up to a maximum of the decimals and shall be written clearly in figures and words. In case of discrepancy between the percentage quoted in figures and words the percentage quoted in words will prevail.
2. In case contractor quotes % only in words and does not quoted in figures or vice versa, such tenders shall be treated as incomplete and rejected.

Sd/-

Signature of the Tenderer Divisional Engineer Electrical,

**With SEAL Master Plan, WCGH,**

**RR, Kukatpally,**

**TSSPDCL/ Hyderabad.**

Tenderer 6