



CHHATTISGARH STATE POWER TRANSMISSION CO. LTD.

(A Govt. of Chhattisgarh undertaking) (A successor company of CSEB)

OFFICE OF EXECUTIVE DIRECTOR (PLANNING & PROJECTS)

**Third Floor, SLDC Building, CSEB Campus
Dangania, Raipur (C.G.)-492013**

CIN- U40108CT2003SGC015820

GSTIN-22AADCC5773E1ZX

TENDER SPECIFICATIONS

TR-20/13

RFX No.8100021993

**CONSTRUCTION OF 220 KV DCDS LINE FROM
400/220KV S/S KURUD TO PROPOSED 220/132KV S/S
PATAN, DIST. DURG (C.G.) ON TURNKEY BASIS
(APPROX. 24 KM.)**

(E-bidding)

LAST DATE & TIME OF SUBMISSION OF TENDER

DATE: 07/07/2021 (TIME 15.00 HRS)

DUE DATE & TIME OF OPENING OF TENDER

DATE: 07/07/2021 (TIME 15.30 HRS)

Website: - www.cspc.co.in/csptcl

PRICE Rs.5,600/- (Printed)

Rs.5,900/- (Downloaded)

OFFICE OF EXECUTIVE DIRECTOR (PLANNING & PROJECTS)**CHHATTISGARH STATE POWER TRANSMISSION CO. LTD.
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KURUD TO PROPOSED 220/132 KV S/S PATAN (DIST. DURG) ON
TURNKEY BASIS (APPROX. 24 KM.)**

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CHHATTISGARH STATE POWER TRANSMISSION CO. LTD.

(A Govt. of Chhattisgarh undertaking) (A successor company of CSEB)

TENDER FORM**TENDER SPECIFICATION TR-20/13**

For construction of 220KV DCDS line from 400/220KV S/S Kurud to proposed 220/132 KV Patan, Dist. Durg on turnkey basis (Approx. 24 Km.)

Tender document SL.No.....*

Issued to M/s..... *

Cost of Tender documents Rs.....

D.D.No.....Dtd.....

Name of Bank

** Not required in case tender document is downloaded*

**Signature & Seal of Issuing Authority
CSPTCL; Raipur**

The undersigned hereby tender and offer (subject to CSPTCL's conditions of tendering), the Chhattisgarh State Power Transmission Company to test and supply, plant, machinery, materials, deliver and execute and do the several works and things which are described or referred to in the enclosures & Annexures to the specification **TR-20/13** copies of which are annexed hereto and which under the terms thereof are to be supplied, executed and done by the contractor in a thoroughly good and workman like manner, and to perform and observe the provisions and agreements or the part of the contract contained in or reasonably to be inferred from the said tender documents for the sum and at the rates set out in schedules annexed hereto.

It is confirmed that:

- (I) Questionnaire for Commercial terms and conditions.
- (II) Questionnaire for Technical specifications of the Materials/Equipments, and
- (III) All other conditions wherever described in the tender documents have been replied in full giving clear details. It has been noted that in case any reply is not given or any reply is incomplete/ambiguous the Company will have right to take the same to be advantageous for the Company. Company's decision in this regard will be final. The bidder will have no right to furnish any technical or commercial clarification after opening of the bid which may in any way alter the offered prices.

Dated, this day of

Bidder's Signature**Bidder's Address.**



CHHATTISGARH STATE POWER TRANSMISSION CO. LTD

(A Government of Chhattisgarh Undertaking)

O/o Executive Director (Planning & Projects)

Address : Third floor, SLDC Building, Danganiya Raipur-492013.

Website : www.cspc.co.in

Phone 0771-2574209/12/38

Fax:0771-2574246

No.02-04/NIT/ TR-20/13/272

Raipur/dtd.29/05/2021

E-NOTICE INVITING TENDER

(E-bidding)

Sealed tenders are invited from experienced Bidders for taking up the following project on turnkey basis-

Tender No.	Particulars	Cost of Tender Documents (Non-refundable)	Earnest money Deposit	Due date of opening of tender
TR-20/13 (RFX No. 8100021993)	Construction of 220KV DCDS line from 400/220KV Sub-station Kurud to proposed 220/132KV Sub-station Patan (Dist. Durg) (Approx. 24 Km.)	Rs.5,600/- (Printed) Rs.5,900/- (Downloaded)	Rs.5.00 lacs	07/07/2021 15.30 hrs.

Last date of sale of tender document: **One day prior to due date of opening of tender.**

NOTE:-

- In case any of the above date is declared as holiday, then the particular date will automatically get shifted to next working day.
- Any notice for extension of due date of tender opening shall not be published in newspapers. It will be displayed only on official website of the company.
- The tender will be processed through e-bidding module of SAP-SRM. Bidders are advised to visit our website www.cspc.co.in/csptcl for viewing detailed instructions regarding submission of offer through SAP-SRM.
- Price bid shall be submitted through e-bidding on or before last date. & time of bid submission. The e-bidding portal for the price bid will be <https://ebidding.cspcl.co.in:50714/irj/portal>.

TERMS AND CONDITIONS:-

- The tender documents can be obtained from the office of the ED/CE (Planning & Projects) in person on payment of cost of tender document in the form of D.D. only made out in the name of MANAGER (RAO : HQ), CSPTCL, Raipur accompanied with firm's application on its letter head. If tender document is required by post, Rs.280/- (i.e., 250/- + 12% GST) shall be paid by D.D. additionally along with the cost of documents. If more than one tender document is required, separate DDs should be furnished for each tender. CSPTCL shall not be responsible for any postal delay in receipt/ non-receipt of tender documents. No receipt of tender shall be issued in any case.
- The tender document can also be downloaded from official website of CSPTCL "www.cspc.co.in" (go through Chhattisgarh State Power Transmission Co. Ltd. - Tender Notice) and Rs 5900/- (i.e. Rs 5,000 /- + 18 % GST) in form of DD in favour of Manager (RAO: HQ), CSPTCL, Raipur payable at Raipur should be submitted along with cost of Earnest

Money Deposit (EMD) in separate envelope. The envelope containing DDs towards cost of tender document & EMD should be suitably super scribed “DDs containing cost of tender document and EMD”. The details of DDs should be mentioned on the outer side of the envelope also. Please note carefully that in absence of aforesaid requisite tender fee, further bid shall not be considered for opening.

- (iii) Tender documents and the detailed specification can be obtained on any working day one day prior to the due date. The tenders duly filled in shall be dropped/get dropped in the specified tender box up to 15:00 Hrs. on the due date. Any other means of delivery shall not be accepted. No receipt of tender shall be issued in any case. The tender box shall be locked/sealed at 15:00 Hrs. on the due date and shall be opened at 15:30 Hrs. on the same date.
- (iv) After publication of NIT & before the date of opening of TC Bid, corrigendum/ other information (if any) shall be displayed on our official website and in SAP SRM(E-bidding Portal only). The bidders are requested to remain in contact with this office or visit our web-site for any development/ clarification/amendment issued subsequently.
- (v) CSPTCL reserves the right to accept or reject any or all the offers, in part or full without assigning any reason whatsoever.

Website: - www.cspc.co.in/csptcl

Sd/-
Executive Director(Planning & Projects)
CSPTCL: Raipur

SCOPE OF THE SPECIFICATIONS

GENERAL:-

1. In the transmission system of Chhattisgarh the **construction of 220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan (Approx. 24 Km.)** is required to be constructed **on turnkey basis**. The specification covers the supply of fabricated galvanized towers materials along with its accessories. The work involves fabrication, galvanizing and delivery of towers and complete construction of **220 KV DCDS line** as mentioned above for total length **24 Km (Approx)** on turnkey basis including Supply of Zebra Conductor, OPGW, G.I. Towers, supply of all line materials i.e. G.I. Bolts & Nuts, spring washer, galvanized earthing rods with clamps, danger board, number plate, phase plate, Anti-climbing Devices (Including fixing arrangements and barbed wires), conductor and OPGW accessories, insulators, stringing hardware etc. and complete construction i.e. **preliminary survey, route alignment, detailed survey, check survey, stub- setting, erection of towers, stringing of the line, etc.** required for turnkey project. Cement and reinforcement steel, metal, sand for foundation of towers shall also be provided by the bidder. The details of work and technical specifications are given in various sections of this specification.
2. CSPTCL shall provide structural drawings and Bill of Materials of 220 KV towers and extensions to the contractor along with foundation drawings after placement of award in sequence, suiting the project requirement. The contractor shall prepare Workshop drawings for fabrication of towers promptly. Before taking up the mass fabrication, the contractor will fabricate proto tower and offer the proto assembly for inspection. Proto assembly of tower shall be inspected by CSPTCL's authorized representative.
3. Bidders are required to quote rates for all materials and works as detailed in the specification. They shall furnish full particulars as called for in addition to filling and completing the Annexure of this specification.
4. All the line materials viz; ACSR conductor, OPGW, EHV Line tower, disc insulators, Stringing Hardware & accessories etc. required for completion of the line shall be supplied by contractor and should be considered for assessing the total of insurance cover.
5. The rates quoted for concreting should include the cost of Cement, Metal, Sand, Water & curing, backfilling etc. Similarly, the rate of reinforcement will include the cost of materials also.
6. The general conditions of tendering and commercial conditions for supply of G.I. Towers & other line materials and erection of the transmission line have been specified in the tender.
7. Bidder shall submit his offer taking into consideration that the design details of towers/ extensions shall be provided by CSPTCL and design rights shall strictly remain with CSPTCL.
8. **Completion Period:** -The work for construction of 220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan (Approx. 24 Km.) is required to be constructed on turnkey basis covered under this specification **should be completed in 18 (Eighteen) calendar months including rainy season from the date of order.** The contractor shall ensure to complete the work of line within aforesaid stipulated period.
9. After completion of the work during the month, the contractor shall submit its bill within three months from its completion positively.

PRE-QUALIFYING REQUIREMENTS

The bidder shall comply with the following requirements along with the offer:-

- 1.1 Sole bidder or joint venture / consortium (not more than 2 firms)** shall be eligible to participate in the tender.
- 1.2** The sole bidder or the partners of JV/consortium should comply all the provisions of Ministry of Finance, Government Of India's order no. F.No.6/18/2019-PPD Dtd. 23.07.2020 (Annexure-42-a) read with amended order No.18/37/2020-PPD Dtd.08.02.2021 (Annexure-42-b) and any subsequent amendments issued upto date of issue of N.I.T. (Tender doc. page 237-249).
- 1.3 FINANCIAL CRITERIA OF PQR :-**
- i) **Net Worth:-** Net Worth of the sole bidder/each partner of joint venture (JV)/ consortium for each of the last three Financial Years (2017-18, 2018-19 & 2019-20) should be positive.
Net worth means the sum total of the paid up capital and free reserves (excluding reserves created out of revaluation) reduced by aggregate value of accumulated losses (including debit balance in profit and loss account for current year) and intangible assets. A certificate issued by Chartered Accountant (in original) showing networth for last 3 financial years (2017-18, 2018-19 & 2019-20) should be submitted.
- ii) **MAAT :-**
The sole bidder/partners of joint venture (JV)/consortium collectively must have minimum average annual turnover (MAAT) for best 3 years out of last 5 financial years (**FY 2015-16, 2016-17, 2017-18, 2018-19 & 2019-20**) equal to **Rs.18.63 Cr.** Self-attested copies (i.e., copies attested by authorised signatory of the tender) of the audited Balance Sheets and profit & loss accounts for last 5 years of sole bidder/each of the partners of the joint venture should be furnished in support, duly certified by chartered accountants of the firm. For calculation of turnover, other income indicated in balance sheet shall not be taken into account.

In case of joint venture/consortium, the lead partner should meet not less than **Rs.11.18 Cr.** of minimum financial criteria regarding turn over requirement. The other partner should meet not less than **Rs.4.66 Cr.** of minimum financial criteria regarding turn over requirement. Both the partners of joint venture/ consortium shall collectively meet the minimum financial criteria.
- iii) **(a) Liquid Assets:-** The bidders (sole bidder/ members of joint venture collectively) shall currently have (i) liquid assets (LA) not less than **Rs.3.11 Cr.** or (ii) evidence of access to or availability of credit facilities not less than **Rs.3.11 Cr.** or (iii) sum of liquid assets and access to availability of credit facilities of not less than **Rs.3.11 Cr.**

A certificate from Chartered Accountant indicating details of Net Worth, Turnover of last 5 (five) FY & (break up) of available liquid assets (issued on a date not earlier than date of issue of NIT) should be furnished as per **Annexure-1** in support of this. *Liquid assets would include cash (and equivalents), bank deposits, securities that can be freely traded and receivables which has general certainty of getting received.*

As regards certificate pertaining to evidence of access to or availability of credit facilities, a certificate from their banker(s) {as per Annexure-29} indicating various fund based / non fund based limits sanctioned to the bidder/ JV Partners and the extent of utilization as on date. **Such certificate should have been issued not earlier than 3 months prior to the date of bid opening.** Wherever necessary, CSPTCL may make queries with the bidder's banker.

In case bidder is a holding company, the Financial Position criteria referred above (i.e., Net-worth, MAAT & LA), shall be that of holding company only (i.e. excluding its subsidiary/group companies).

In case bidder is a subsidiary of a holding company, the Financial Position criteria referred above, shall be that of subsidiary company only (i.e. excluding its holding company).

Note :-For the instant tender, the turnover of last 5 financial years i.e. 2015-16, 2016-17, 2017-18, 2018-19 & 2019-20 shall be considered for calculation.

(b) Cash Flow Requirement :-

The bidders (sole bidder/ members of joint venture collectively) must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet out the cash flow during the contract period, estimated as not less than **Rs.3.11 crore** taking into account the bidder's overall cash flow requirement for this contract and his current works" commitment for other contracts. Bidder shall submit above information (Financial Resources) in Annexure 4-A and information regarding current contract commitments / works in progress in Annexure 4-B provided in bid documents.

Difference of Total proposed Financial Resources to be available during the period of execution of work against the instant tender as per Annexure 4-A) and Total Expected value of work to be carried out against bidder's other current contracts commitments / works in progress during the completion period against the instant tender as per Annexure 4-B) must be positive & should not be less than **Rs.3.11 crore**

- iv) The sole bidder/partners of joint venture (JV)/consortium (each partner of JV) shall submit certificates (in original as per prescribed **Annexure A-39**) issued by Chartered Accountant, confirming fulfilment of following criteria :-
- a) The sole bidder/partners of joint venture (JV)/consortium (each partner of JV) should have discharged all its payment obligations (principal/interest) on outstanding debentures (i.e. debentures which have not yet been redeemed), if any and no such payments as on **31/12/2020** should be outstanding / overdue.
 - b) The sole bidder/partners of joint venture (JV)/consortium(each partner of JV) should not be presently in default in payment of any bank loan or interest thereon for more than three months or any loan account of the bidder should not have been classified as NPA (Non performing assets) by the creditor/ lending bank, as on date of issue of NIT.
 - c) The sole bidder/partners of joint venture (JV)/consortium (each partner of JV) should not be under process of insolvency or liquidation as on the date of issue of NIT. Even at the later date up to opening of price bids against the instant tender, it if comes to the notice of CSPTCL that the sole bidder/ any partner of

JV has been going through the process of insolvency or liquidation, their bid will be rejected.

- v) The sole bidder/partners of joint venture (JV)/consortium should not be debarred/blacklisted by Bank/State Govt/Central Govt./State PSU/CPSU/SEB/public utility as on date of issue of NIT. A declaration in this regard shall be furnished by the bidder(Annexure-A-38)

However, the bid may not be considered for further processing in following cases also:-

- i) If the sole bidder/partners of joint venture (JV)/consortium(each partner of JV)is debarred/blacklisted by Bank/State Govt./Central Govt./State PSU/CPSU/SEB/public utility up to date of opening of price bid of the instant tender.
 - ii) If a case comes to notice regarding submission of forged/fake document in any other tender under process in CSPTCL up to date of opening of price bid of the instant tender.
- vi) All the documents / statements / attachments / information submitted by the sole bidder/partners of joint venture (JV)/consortium in proof of the qualifying requirements must be authentic / genuine /correct and in case, any of the said documents / statements / attachments / information are found to be false / fake / misleading, the bidder will be disqualified and action will be taken against the bidder as per relevant provisions of the tender. A declaration in this regard (as per prescribed Annexure A-38) shall be furnished by the sole bidder/ each partner of JV (separately).

3.2 TECHNICAL EXPERIENCE CRITERIA OF POR :-

Sole bidder or Joint Venture / consortium bidder

(A) **Project Capability:** - Sole bidder or Joint Venture(JV)/consortium bidder should have constructed & commissioned at-least following Transmission line on turnkey basis during last 5 years i.e. FY 2015-16 to FY 2019-20 (between 1st Apl'2015 & 31st March'2020) against order issued by the following Indian entities :-

- (i) Power utilities owned and controlled by Central or State Govt., **Or**
 - (ii) PSUs, **Or**
 - (iii) Govt. organizations
- At-least **100%** of route length (i.e., **100%** of tendered route length) of 220 KV (or above voltage class) Transmission line (cumulative) **OR 25 km** of route length of 220 KV (or above voltage class) transmission line (cumulative), *whichever is higher i.e.25km in the instant case*, on turnkey basis. The date of order should not be older than 7 years from the date of issue of NIT of the instant tender.
 - The above line should be in successful operation for minimum 1 (one) year from the date of its commissioning as on date of issue of NIT of the instant tender.

The bidder shall submit self attested detailed order copies & Performance certificate for satisfactory operation of transmission line issued by the Power Utilities or User Agencies in the name of participating bidder, indicating date of commencement of work and it's commissioning.

The word "Commissioning" here means of energization of Transmission line duly certified by concerned power utility.

Note:-

- i. In case of Sole bidder, the experience of the bidder shall be that of “Sole bidder” or “any one of the partner of the Joint Venture/ consortium” in the projects executed by them earlier.
- ii. In case the bid is submitted by JV / consortium, either of the JV i.e., the “Lead partner” or the “Other partner” should meet the requirement as required for sole bidder.

The experience of any one of the partners of the joint ventures / consortium (lead partner or other partner) meeting the above ‘Project Capability’ criteria shall either be as “Sole bidder” or “any one of the partner” of the Joint Venture/ consortium” in the projects executed by them earlier.

(B) Manufacturing facilities:-

The sole bidder or any one of the partners of the joint venture/consortium (lead partner or other partner) should have its own manufacturing and galvanizing facilities for the transmission line tower and should have fabricated and galvanized at least **600 MT** transmission line tower per year during last three financial years (2017-18 , 2018-19& 2019-20).

OR

The sole bidder or any one of the partners of joint venture / consortium (Lead partner or other partner) should have its own manufacturing and galvanizing facilities for transmission line tower and should have fabricated and galvanized at least **360 MT** per year during last three financial years (2017-18 , 2018-19 & 2019-20) and the bidder must furnish an undertaking from tower manufacturer in a prescribed format given in the **Annexure A-22** in the bid, to outsource balance quantity of **240 MT** transmission line towers from them.

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The sole bidder or any one of the partners of joint venture / consortium (Lead partner or other partner) should have assured access from tower manufacturers meeting the requirements i.e. **600 MT** per year for last three financial years (2017-18 , 2018-19 & 2019-20). A Joint deed of undertaking with the manufacturer(s) in a prescribed format given in the **Annexure A-34** in the bid should be furnished with the technical bid.

The bidder is required to furnish self attested documentary evidence for meeting the criterion mentioned above.

Bidders may note that evaluation of various pre-qualifying experience criteria shall be done on the basis of documents / certificates submitted by the bidder, for which responsibility to furnish essential authentic, genuine & correct documentary proof / statements / attachments / information etc., entirely rests on the participating bidder(s). CSPTCL will not be responsible if the bid is considered non-responsive and rejected in the absence of such documentary proof.

- 3.3 PRE-CONTRACT INTEGRITY PACT:** - The bidder shall have to submit pre contract integrity pact in the format enclosed as **Annexure A-31** on non judicial stamp paper worth Rs.300/- duly signed by the bidder for the project along with techno commercial bid. The validity of this integrity pact shall be from the date of its signing and extended up to 2 years or the complete execution of the contract to the satisfaction of both the Buyer and the Bidder/Seller, whichever is later. In case Bidder is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

4. OTHER ELIGIBILITY CRITERIA:-

- i) The sole bidder / lead partner of the joint venture / consortium should submit a certified copy of 'A' class electrical contractor license issued by **C.G. Anugyapan Mandal /CG State licensing Board** along with his offer and the license should be valid as on the date of opening of tender **OR** the bidder shall furnish an Undertaking to submit 'A' class electrical contractor license issued by C.G. Anugyapan Mandal / CG State licensing Board within 30 days after issue of Letter of Award (LOA).
- ii) The sole bidder/lead partner of the joint venture/consortium should have EPF code number allotted by EPF Commissioner and copy of same should be submitted with the TC Bid.
- iii) The sole bidder/joint venture or consortium partners should collectively have adequate tools & plants, financial and technical resources and infrastructure backed with qualified agencies to execute the work properly and expeditiously within the specified time frame. A declaration in this regard shall be submitted in the Annexure-14.
- iv) Power of attorney issued to legally authorized signatory should be submitted in the TC bid.
- v) Those bidders which are not registered under GST shall not be allowed to participate in the tender.
- vi) Detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years (counted from the date of bid submission) shall be provided in **Annexure-20**. A consistent history of awards involving litigation against the bidder or any partner of JV may result in rejection of bid.

In case of Joint Venture (JV)/Consortium, the following conditions shall also apply:-

- (i) No bidder/member of a JV/consortium can participate in more than one bid.
- (ii) One of the partners shall be nominated as lead partner and the joint venture/consortium shall be represented by Lead Partner. An agreement for authorizing one partner to act as "Lead partner" in **proforma 37** (Form of Power of attorney for Joint Venture) signed by legally authorized signatories of both the partners on judicial stamp paper duly attested by Public Notary with seal and revenue stamp affixed thereon should be submitted with the technical bid. The "Lead Partner" shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture/Consortium. The "lead partner" shall be responsible for timely execution & completion of all the activities. Entire execution of the contract shall be done by the "Lead Partner" and payment under the contract shall be received by the "Lead Partner" on behalf of the Joint Venture/Consortium as per power conferred to him in the Power of Attorney. All the correspondences etc. shall be done exclusively with the "lead partner". The bid document should have been purchased and submitted by the "Lead Partner" only.
- (iii) The partners of the Joint Venture/Consortium shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a statement to this effect shall be included in the authorization mentioned under (ii) above as well as in the Bid Form and in the Contract Form (in case of a successful bid). The lead partner shall be authorized to incur liabilities and receive instructions for and on behalf of all the members.
- (iv) The agreement entered into, signed by the Joint Venture/Consortium partners, shall be submitted with the bid. Original copy of JV Undertaking in **proforma-36** (form of undertaking by the Joint Venture Partners) on judicial stamp paper duly attested by Public Notary with seal and revenue stamp affixed thereon indicating joint and several liabilities among the parties to the Joint Venture should be provided with the bid. No joint venture will be accepted after submission of the tender bid. The joint venture/consortium shall remain valid for entire contractual period and the same shall be mentioned in the agreement. In case of any breach of contract by any of the joint venture/consortium partners during execution of the contract, the same shall be deemed to be default by both

the partners. It will be the sole discretion of CSPTCL to allow the other partner to complete the work or to terminate the total contract.

- (v) The bid shall be signed so as to be legally binding upon both the partners of the joint venture/consortium. The non-judicial stamp paper shall be purchased in the name of joint venture and the date of purchase should not be later than six months of date of execution of the undertaking/ agreement shall be signed on all the pages by authorized representatives of each of the partners and should invariably witnessed.

Although details presented in this tender specification have been compiled with all reasonable care, it is the responsibility of the bidder to satisfy himself that the information given in each section are adequate and there are no conflicts between various clauses/sections/specifications. The clarification/ decision of the Executive Director / Chief Engineer (Planning & Projects) shall be final and conclusive.

- (vi) **“EXTREMELY IMPORTANT”**

Bidder to note this to avoid bid rejection’:-

It will be the sole responsibility of the sole bidder/partners of joint venture (JV)/consortium bidder to make sure that all the documents required as per tender are submitted along with bid on or before due date of tender. The bid submission date is cut- off date of submission of all the documents required as per tender and every bidder must adhere to this dead line.

However, if any short comings is observed during scrutiny of TC bid, CSPTCL reserves the right to seek required clarifications/ documents from bidder by giving them only one chance to submit required documents/ clarifications/ confirmations within specified time limit.”

If a bidder has quoted “NIL” deviations in **Annexure-9** (deviation from technical specifications/ conditions) and **Annexure-19** (deviation from commercial conditions) this will have an overriding effect on any other conditions noted as deviations elsewhere in the bid.

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SECTION – I

Instructions to Bidders

(A) Special Instructions to bidders for submission of bid through SAP- SRM module (E-bidding)

The price bid against tender specification no. **TR-20/13** is to be processed through e-bidding. For participation in E-bidding ,it is mandatory for prospective bidders to get registered online through our website & portal <http://www.cspc.co.in> & <https://ebidding.cspcl.co.in:50724/irj/portal>., on registration the bidders will get User ID and Password for participating in the tender.

The techno commercial bid is to be submitted in hard copy whereas the price bid is to be submitted online (E-Bidding portal). Details of NIT & Tender Documents are available on our website and portal as indicated above.

The bidder may download the same from the above site. In e-bidding portal, tender documents will be displayed in online tender display at Technical RFX section.

For bidders, it is recommended to open the e-bidding portal by the following the path www.cspc.co.in->e-Bidding->"click here for e-Bidding Web portal".

Last date & time of submission of TC bid in hard copy and price bid in softcopy is **00/00/2020 upto 03:00 pm** and due date & time of opening of the tender is **00/00/2020 upto 03:30 pm**.

Important Instructions :-

1. Please note that this tender shall be processed online as well as offline. The bidder has to submit all the documents in hard copy as per tender specifications in four envelopes..
2. **The abstract(total) amount of Annexure A-1 & A-2 are to be filled in the item tab in e-bid in SAP SRM System (online e-tender). Amount should be quoted online & in specified fields only. It is required to upload scanned copy of ONLY price bid SCHEDULES DULY FILLED IN AND SIGNED WITH SEAL OF FIRM IN THE specified FOLDER along with the duly filled excel sheets of price schedules. It may be noted that the bid will not be considered for evaluation in case the bidder has not uploaded the scanned copies of duly filled price Bid annexure with seal & signature of bidder even he submit the summary in E-bidding portal.**

Discount (if any) offered by the bidder should be filled in the respective field in the SAP SRM system (E-bidding Portal) only. Discount for each of the schedules i.e. A-1 & A-2 is to be indicated separately in the respective fields. No discount offer shall be considered which is indicated elsewhere for the purpose of evaluation and comparative statement. Once the rates are filled, the bidders may change their rates upto the due date and time of submission of tender. After due date and time, no change on any ground whatsoever will be accepted.

3. After scrutiny of techno-commercial bid, the price bid will be opened in e-bidding system only of eligible bidders for which suitable intimation will be given to the bidders offline & through email.
4. Please note that e-mail is always system generated, hence bidders are advised to regularly check their inbox/junk mail box.

5. CSPTCL shall not assume any responsibility for non-supporting of system, internet, line & associated hardware & software for bidding their tender. No extension in time shall be granted on such grounds. The bidder should submit their bid well before submission dead line to avoid any system related problem. It is strongly recommended not to wait for submission of bid in last minutes as internet/technical problem may disrupt their works.
6. Reference time for submission dead line shall be the time displayed in the portal and shall be treated as final.
7. After end of submission dead line, no alteration in the tender will be allowed by the system. However, in case of extension of due date of opening of tender, the bidders will be allowed to submit revised bid in the system.
8. CSPTCL will not accept incomplete bid.
9. The bidder must have a valid Digital Signature(class –III digital certificate) to establish the identity of the bidder & SAP SRM User ID. User ID & Password from CSPTCL and Digital Signing Certificate and Digital Encryption Certificate from any recognized digital signature issuing authority are required for participation in any Tender. The bidder shall intimate in advance regarding details of digital signature issuing authority for ensuring the reliability of the same. ***It may please be noted that the tender shall be submitted with valid digital signature of Lead partner only in case of joint venture/consortium else the same will not be considered for evaluation.***
10. The e-bidding vendor user manual displayed on website-<https://ebidding.cspcl.co.in:50724/irj/portal> for the help of the bidders. For any further queries the bidder may contact at Helpline no. 0771-2576672/73 (EITC, CSPDCL, Raipur)
11. Tender shall be opened in the scheduled time as notified. If the due date of opening/submission of tender documents is declared a holiday by the Govt. or local administration, it will be automatically shifted to next working day for which no prior intimation shall be given. Tender opening shall be continued on subsequent days, in case the opening of all tenders is not completed on due date because of the technical constraints of system on the day of opening. It may be noted that the due date of opening/time may be altered/ extended if desired by CSPTCL without assigning any reason. However, intimation shall be available on company's tender portal/bidders email (if participation shown). The bidders are requested to keep track of the same.
12. Amendment in tender specification will be published on our website as well as in SRM system and the intimation regarding amendment in date extension will be conveyed through system generated e-mail to registered bidders only.
13. Before participating the bidder shall carefully read all the instructions and processes.
14. Tender duly completed in all respects will be accepted online up to due date & time and will be opened on the due date at specified time in the presence of tenderers or their authorized representatives. In case of authorized representative(s) they shall bring the original authorization letter with their signature attested by the bidder.

(B) General Instructions to bidders :-

1.01 Sealed Tenders in duplicate on two part basis (each complete with all details in the manner specified together with drawings, test reports, descriptive literature if any) and declaration form duly signed by bidder are to be dropped in tender box placed in the office of the Chief Engineer (Planning & Projects), Chhattisgarh State Power Transmission Co. Ltd., Dangania Raipur, for this particular tender No.**TR-20/13** in double sealed cover & super scribed on each of the covers the relevant tender specification number and due date of opening as indicated in the “Notice Inviting Tenders”.

In case, the tender is sent through post / courier, it will be responsibility of the bidder to drop/ get it dropped the tender in the tender box. Receipt of tenders shall not be given in any case. The tender should be dropped before or up to 3.00 pm on due date of submission. Tender box shall be sealed at 03.00 pm and in no case tenders shall be allowed to be dropped in the tender box after 03.00 pm.

1.02 The Specification is divided into five Sections: -

Part-I Techno Commercial

- (i) Section - I Instruction to Bidders,
- (ii) Section-II General Conditions of Contract,
- (iii) Section- III Commercial Conditions
- (iv) Section-IV Technical Conditions
- (v) Section-V Annexures & Formats

Part II Price bid formats.

1.03 Tenders will be opened in the office of E.D./C.E. (Planning & Projects), **CSPTCL**, Dangania, Raipur (CG) 492013, in the presence of bidders or their authorized representatives (limited to two persons only with a valid authorization from their employer). At the time of opening, the techno-commercial bid and other relevant details will be read out. Price bid of successful Techno commercial bidder would be opened at a later date with due information to the successful bidders.

1.04 The bidder may deviate from the specification while quoting if in his opinion such deviation is in line with the manufacturer’s standard practice and conducive to a better and more economical offer. All such deviations should however be clearly indicated giving full justifications for such deviation in separate sheet(s) under “Deviations” title in annexure.

1.05 Only those who have purchased the copy of relevant Specification No.**TR-20/13** or downloaded from CSPTCL’s official website (Along with cost of document) can submit their tender. Tenders submitted by others will be rejected.

1.06 The **CSPTCL** reserves the right to reject the lowest or any other tenders or all tenders without assigning any reason whatsoever, if it is considered expedient in the overall interest of **CSPTCL**.

1.07 The tender should be in two parts, Part – I for techno-commercial details in DUPLICATE and Part – II for prices in DUPLICATE. The tenders shall be submitted in two parts and should be enclosed in sealed cover both addressed to the Executive Director / Chief Engineer (Planning & Projects), **CSPTCL**, Dangania, Raipur (CG) 492013. Covers should be sealed and super scribed with tender specification No.**TR-20/13** and date of opening. Tenders being submitted must be signed by a person holding a power of attorney authorizing him to do so. The notarized copy of power of attorney should be furnished. Tenders submitted on behalf of company registered under Indian Companies Act shall be signed by person duly authorized to sign the tender on behalf of the company and shall be accompanied by notarized copy of resolution / abstract of Article of Association/ special or general power of attorney.

- 1.08 The bidders are required to submit tenders in the following manner. All documents / information of tender as described below shall be placed in a sealed cover containing four separate sealed covers as mentioned below :-

In certain cases confusion takes place regarding furnishing of earnest money since the Envelopes are not properly super-scribed and sealed by the tenderer. It is therefore intimated that FOUR envelopes as under are to be submitted.

- a) Envelope - I:-This envelope should contain a covering letter with earnest money along with tender form in original. The cover of envelope should be suitably super-scribed with **“Earnest Money and cost of tender document” should contain the Banker’s cheque / demand draft and Goods & Service Tax (GST) Registration Certificate.** The envelope should be sealed properly.

In case, the tender has been download from CSPTCL’s official website, the required cost of tender document in the form of MICR DD drawn in favour of Manager (RAO:HQ), CSPTCL, Raipur (C.G.) should also be kept inside this envelope. Please note that in case the cost of tender document & Goods & Service Tax (GST) Registration Certificate is not furnished with the tender, further bids shall not be opened.

- b) Envelope - II: - This envelope should contain the Pre Qualification requirements in DUPLICATE with detailed order copy of work executed and their completion certificate.
- c) Envelope - III:- This envelope should contain the Technical Bid and Commercial Bid complete in all respects, Pre-contract integrity pact (Annexure-31) and copy of unpriced / unfilled price bid schedule (Schedule A-1, A-2 & A-3 of tender) in DUPLICATE. In case of difference in original and duplicate bid, the contents of original bid will be taken in to account.
- d) Envelope - IV: - This large envelope should contain all the above Three envelopes.

Any envelope apart from the above mentioned envelopes shall not be entertained.

Any envelope apart from the above mentioned envelopes shall not be entertained.

- (ii) All the envelopes shall be addressed as under:-
Executive Director (Planning& Project),
Chhattisgarh State Power Transmission Company Limited,
(A Successor Company of CSEB), DANGANIA – RAIPUR 492013
- (iii) The outer main envelope containing the above envelopes shall bear the following identification:-
“Tender No.TR-20/13 for Fabrication, Galvanising & Supply of Towers & other line materials and complete **construction of 220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan (Approx. 24 Km.)** is required to be constructed on turnkey basis. The words **“DO NOT OPEN BEFORE -----”**(date of Bid opening) should also appear on it.
- (iv) The outer and inner envelopes shall also indicate the name and full mailing address of the Bidder to enable the Bid to be returned unopened in case it is declared “Late” or otherwise not acceptable.

In case the above instructions are not followed properly and any of their envelope is not available for inspection and opening, no representation at due time of tender opening shall be accepted and such offers shall not be opened.

1.09 Tenders received after due date and time shall not be opened.

1.10 Telegraphic or FAX tenders shall not be accepted under any circumstances.

1.11 EARNEST MONEY DEPOSIT:-

The tender shall be accompanied by Earnest Money deposit of Rs.5,00,000/- (Rupees Five Lac only).

The Earnest money Deposit shall be offered in one of the following forms subject to the conditions mentioned below:-

- i. Bank Draft to be drawn in favour of “Manager, (RAO:HQ), CSPTCL, Raipur (C.G.)”
- ii. No interest shall be paid on Earnest Money Deposit.
- iii. No adjustment towards Earnest Money Deposit shall be permitted against any outstanding amount with CSPTCL.
- iv. In the case of unsuccessful bidder, the Earnest Money will be refunded after finalization of tender. In case of successful bidder Earnest Money will be refunded only after furnishing security deposit 10% of order value.
- v. Earnest money/ security deposit will be forfeited if the bidder fails to accept the letter of intent or purchase order(s) issued in his favour.
- vi. Tenders not accompanied by Earnest Money shall be disqualified.
- vii. Cost of tender document is non refundable.

1.12 FORFEITURE OF EARNEST MONEY:-

The Bid security is required to protect the **CSPTCL** against the risk of Bidder's conduct, which would warrant the Earnest Money's forfeiture, due to following reasons:

- a) If a Bidder withdraws his Bid during the period of Bid validity specified.
- b) In the event of refusal to accept the Letter of Intent placed by the Purchaser within the validity period.
- c) In the case of a successful Bidder if he fails to sign the various Agreements and fails to furnish Security Deposit as specified in the Tender Specification.

The successful Bidder's Earnest Money will be discharged only after the execution of various Agreements and Security deposit by the Bidder (as specified in this tender Specification).

1.13 VALIDITY:-The tenders should be kept valid for a period of 180 days from the date of opening of the tenders as notified in the tender notice and subsequently amendment thereof failing which the tenders will be rejected.

1.14 The contractors are advised to visit the proposed / likely routes of the lines to acquaint himself about topography of the line routes and other details before submitting the bids.

1.15 The successful bidder are required to submit the Project License Certificate from Chief Electrical Inspector & Safety / Industrial Relations Officer of Government of C.G. within one month from the date of acceptance of LOI in respect of the said work; otherwise the same is liable for rejection without notice.

1.16 PRICE-BID & ITS EVALUATION :-

Bidders must quote their price in accordance with the specifications and conditions. Any deviation from the above shall be considered as an alternate bid. The bids will be evaluated based on the main offer only.

Price Part of only those Bidders shall be opened on-line who are determined as having submitted substantially responsive bids and are ascertained to be qualified to satisfactorily perform the Contract. Such Bidders shall be intimated about the date and time for opening of Price Part by the Employer.

The Employer will on-line open Price Bid at the specified time and date in the presence of bidders' designated representatives who choose to attend, at the time, date, and location stipulated in the intimation for opening of price bid. The bidders' representatives who are present shall sign a register evidencing their attendance.

The bidders' names, the Bid Prices or any discounts, and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. The prices and details as may be read out during the bid opening and recorded in the Bid Opening Statement would not be construed to determine the relative ranking amongst the Bidders, or the successful Bidder, and would not confer any right or claim whatsoever on any Bidder. The successful Bidder (also referred to as the L1 Bidder) shall be determined as per the provisions of this evaluation criteria.

The Employer shall prepare minutes of the bid opening, including the information disclosed to those present who present at the time of opening.

Bids not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances.

- i. In the event of noticing arithmetical errors viz. multiplication of price & quantity, grand total of total amount etc. these shall be corrected and computation shall be done accordingly.
- ii. **The quoted price should be kept valid for the contractual period/ completion of the project. However the provision of price variation shall be applicable as per the relevant clause of the tender.**
- iii. All columns shall be completely filled up properly.
- iv. No conditional prices should be quoted.
- v. The evaluation of price bids shall be done by comparing the Grand total (i.e. Total of all the price bid annexures) quoted by the bidder in price schedule Annex-A-1 and Annexure A-2 of all the items including GST & levies. Based on the comparative evaluation, LOA shall be placed on the L-1 bidder (lowest quoted price for entire project) on the final accepted price.
- vi. **The loading of the items for which the prices are not being quoted by bidder: - In such cases, loading will be done at highest prices quoted amongst the participating bidder. But, while ordering, lowest price amongst the bidders will be considered.**
- vii. If the quantity quoted is less than B.O.Q. /or required for turnkey completion of the job, loading will be done on the pro-rata basis.
- viii. In case the bidder makes contradictory statement in the Technical & Commercial Bid or for items for which the prices are not being quoted by bidders, loading will be

done at highest prices quoted among the participated tenderers. But, while ordering, lowest price among the bidders will be offered.

- ix. All the material, accessories, including charges for erection & commissioning etc. required for construction & commissioning of EHV line should have been included in the price schedule i.e. Annexure A-1 & Annexure A-2.
- x. If there is discrepancy between the Unit Price and the total price that is obtained by multiplying the unit price & Quantity, the Unit Price shall prevail and total price shall be corrected accordingly. Further, in case there is discrepancy observed in the abstract of rate submitted in E-bidding portal, Excel sheets of price bid annexure uploaded in portal and Scanned copies of price bid annexure duly signed by bidders, the unit rates offered in the scanned copies of price bid annexures shall be prevailing.
- xi. The prices for supply of line material & construction charges of line should be quoted as per the break up mentioned here under:-
 - a) **Supply of Line material:**
The breakup of unit rate, freight and GST should be given in the price bid. Applicable cess @ 1% of the cost shall be borne by the contractor and shall be deducted from each bill for remittance to the concerned government department.
 - (b) **Construction charges for line:**
The rates for construction charges should clearly indicate the unit rate and GST. Applicable cess @ 1% of the cost shall be borne by the contractor and shall be deducted from each bill for remittance to the concerned government department.
The breakup of taxes should be clearly mentioned. In case of any such ambiguous statement, it will be presumed that rates are inclusive of taxes and no claim for such taxes shall be entertained.
- xii. The amount of ex-works price, taxes etc. quoted in the price bids shall be rounded-off upto 2 (two) digits of paise and accordingly the calculation shall be done while evaluation.
- xiii. CSPTCL's decision in such cases shall be final.

Although details presented in this tender specification have been compiled with all reasonable care, it is the responsibility of the bidder to satisfy himself that the information given in each section are adequate and there are no conflicts between various clauses/sections/specifications. The clarification/decision of the Executive Director / Chief Engineer (Planning & Projects) shall be final and conclusive.

1.17 NEGOTIATION OF PRICES:- CSPTCL reserves the right to hold negotiation with L-1 bidder as deemed necessary. Procedure adopted by CSPTCL for holding negotiation shall be final and binding on all bidders.

1.18 TIME SCHEDULE & CLARIFICATIONS:-

In view of the urgency, generally the date of opening of this tender will not be extended. It is therefore necessary that the tender documents are read by bidders carefully and clarifications, if any, required before furnishing of tenders is promptly obtained. For any delay in this regard, CSPTCL will not be responsible and any request for extension of due date will not be entertained.

1.19 INCOME TAX CLEARANCE CERTIFICATE:
Income Tax clearance Certificate may be submitted.

1.20 **CLAIMS FOR ITEMS NOT ENTERED IN THE SCHEDULE OF ITEMS:**
Items shown in the schedule of items are purely for the purpose of indicating the type of work to be carried out and no claim shall be entertained for any item or work executed being not mentioned in the aforesaid schedule.

1.21 **SCHEDULES AND ANNEXURES:**

Annexures giving details of various items are enclosed at the end of the specifications (**section V**). Bidder should consult these annexures before filling the tender.

Forms of schedules are also enclosed in the specifications. Bidders are required to go through the complete specification and consult explanatory notes, before filling in various schedules / annexures.

All the points mentioned in schedules and annexures shall be filled in by the bidders and complete information shall be supplied. Incomplete schedules may make his tender liable for rejection.

1.22 **COMPLETENESS OF TENDER:**

Each section of the tender should be complete and include all associated works not specifically mentioned in the schedule / specification etc. but essential for the completeness of the work. The contractor shall not be eligible for any extra charges in respect of such minor works though not specifically included in the tender or contract schedule.

1.23 **DEPARTURE FROM SPECIFICATION:**

If the bidder wishes to depart from the specification in any respect, he shall draw attention to such points of departure, explaining fully the reasons thereof, so that the relative merits of the proposal may be considered. Unless this is done, the requirement of this specification will hold good. Such departures from specification shall be indicated in respective schedules.

1.24 **QUESTIONNAIRE:**

The questionnaire enclosed herewith (Annexure-10) contain a set of questions, and bidder is requested to answer each and every question clearly and without ambiguity.

1.25 **CHECK-LIST:**

The check list (Annexure-32) in respect of various schedules etc is required to be submitted by the bidder without which the tender will be considered incomplete and liable for rejection. The bidder should submit all schedules duly filled in along with this offer.

1.26 **NATURE OF CONTRACT :-**

It will be composite in nature, which shall consist of reconnaissance survey, preliminary survey, route alignment, detailed survey, Check Survey, Stub Setting, Erection & stringing charges etc., Supply of 220 KV G.I. Towers, Conductor, OPGW, Disc Insulators, hardware'setc. & all other line materials, required for turn-key project.

1.27 **CONFLICTING PROVISIONS:-**

Although details presented in this Tender Specification have been compiled with all reasonable care, it is the responsibility of the Bidder to satisfy himself that the

information's given in each section are adequate and that there are no conflicts between various clauses/ sections/ Specifications. In case of any variation, the same may be referred to C.E. (Planning & Projects) for clarification / decision before due date of submission. The clarification/ decision of C.E.(Planning & Projects) shall be final and conclusive.

1.28 **NON RESPONSIVE BID :-**

CSPTCL reserves the right to reject any Bid, which is:

- (a) Not accompanied by the Earnest Money as specified above.
- (b) Not received by the due date and time specified.
- (c) In variance with specified terms and conditions.
- (d) If any time, it is found that a material misrepresentation of facts is made or uncovered.
- (e) The Bidder does not respond promptly and thoroughly to the request for supplementary information required for the evaluation of his Bid.
- (f) If the Bidder fails to super scribe on the envelope containing the Bid, the details of Earnest Money deposited by him, the Purchaser shall not accept any responsibility and the offers received shall be rejected and shall be returned to the Bidders.

1.29 **TERMINATION:-**

In the event of any breach of the terms of the order, the CSPTCL reserves the right to:-

- (i) Cancel the order for part or whole of the materials yet to be supplied or work to be executed on the risk & cost of contractor without any liability on CSPTCL.
- (ii) To purchase elsewhere or to execute the work with other agency on the risk & cost of the contractor, part or whole of the materials so affected or work to be executed without any liability on CSPTCL.

1.30 **INTEGRITY PACT: -**

The bidder shall have to submit pre-contract integrity pact in the format enclosed as **Annexure-31** on non-judicial stamp paper worth Rs. 300/- duly signed by the bidder along with the Techno-Commercial bid. The validity of this integrity pact shall be from the date of its signing and extended up to 2 years or the complete execution of the contract to the satisfaction of both the Buyer and the Bidder/Seller, whichever is later. In case Bidder is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

Although details presented in this tender specification have been compiled with all reasonable care, it is the responsibility of the bidder to satisfy himself that the information given in each section are adequate and there are no conflicts between various clauses/sections/specifications. The clarification/decision of the ED/CE (Planning& Projects) shall be final and conclusive.

1.31. **UNSATISFACTORY PERFORMANCE (Debarred/ blacklisted):-**

The bidder(s) who have been debarred/ blacklisted for future business with CSPTCL/ or any other successor power companies of erstwhile CSEB, or found to be violate any provision(s) contained in the tender document during any stage of bid or during pre contract stage, their bid shall not be considered for further evaluation and the bidder can be disqualified from tender process or the contract, if already awarded, can be terminated for such reason.

1.32 The bidders shall be required to submit following documents in respect of PQR & other requirements for the instant tender TR-20/13:-

A) Documents in respect of PQR:-

- 1) Self-attested copies (i.e. copies attested by authorised signatory of the tender) for profit & loss account statement and audited balance sheets for last 5 financial years (i.e., FY 2015-16 to FY 2019-20).

A statement showing 'Annual Turnover' for the last five financial years (FY 2015-16, 2016-17, 2017-18, 2018-19 & 2019-20) & 'Net worth' including assets and liability of the sole bidder/lead partner of JV as well as for the other partner of JV, duly certified by chartered accountant for the last three financial years (FY 2017-18, 2018-19 & 2019-20) shall be furnished.

- 2) (a) **For Liquid Assets :-**A certificate from Chartered Accountant indicating details of Net Worth, Turnover of last 5 (five) FY & (break up) of available liquid assets (issued on a date not earlier than date of issue of NIT) should be furnished as per **Annexure-1** in support of this.

The bidder shall also furnish certificate from their banker(s) {as per Annexure-29} indicating various fund based / non fund based limits sanctioned to the bidder/ JV Partners and the extent of utilization as on date. **Such certificate should have been issued not earlier than 3 months prior to the date of bid opening.**

(b) For Cash Flow Requirement :-

The bidders (sole bidder/ members of joint venture collectively) shall submit information regarding Financial Resources in **Annexure 4-A** and information regarding current contract commitments / works in progress in **Annexure 4-B**.

- 3) The bidder/ JV partners shall submit Certificates (**in original as per prescribed Annexure A-39**) issued by CA, confirming fulfillment of following criteria :-
- a) Sole bidder/ Lead partner as well as other partner of the joint venture should have discharged all its payment obligations (principal/interest) on outstanding debentures (i.e. debentures which have not yet been redeemed), if any and no such payments as on dtd. **31/12/2020** should be outstanding / overdue.
- b) Sole bidder/ Lead partner as well as other partner of the joint venture should not be presently in default in payment of any bank loan or interest thereon for more than three months or any loan account of the bidder should not have been classified as NPA (Non performing assets) by the creditor/ lending bank, as on date of issue of NIT.
- c) Sole bidder/ each partner of JV should not be under process of insolvency or liquidation as on the date of issue of NIT. Even, if at a later date up to opening of price bid against the instant tender, if it comes to the notice of CSPTCL that the sole/ any partner of JV has been going through the process of insolvency

or liquidation, their bid will be rejected and action will be taken against the bidder as per relevant provisions of the tender.

This certificate shall be submitted by sole bidder / Lead partner as well as Other partner of the joint venture.

- 4) A declaration by the sole bidder/lead partner of JV as well as other partner of JV (Separately) **(as per prescribed Annexure A-38)** that their firm is not debarred / black-listed by Bank / State Govt. / Central Govt. / State PSU / CPSU / SEB / Public utility as on date of issue of NIT and in case any of the document/ statements / attachments / information is found to be false / fake / misleading , the bid will be disqualified and action will be taken against the bidder as per relevant provisions of the tender.
- 5) A declaration by the sole bidder/lead partner of JV as well as other partner of JV (Separately) **(as per prescribed Annexure A-38)** that all the documents / statements / attachments / information submitted by the bidder in proof of the qualifying requirements are authentic / genuine /correct and in case any of the said documents / statements / attachments / information are found to be false / fake / misleading, the bidder will be disqualified and action will be taken against the bidder as per relevant provisions of the tender.
- 6) Following documents fulfilling the “Technical experience criteria of PQR”:-
 - i) Complete detailed order copy (self-attested by authorised signatory of the tender), in support of technical experience criteria of PQR for having constructed & commissioned required route length of transmission lines on turnkey basis during last 5 years i.e. FY 2015-16 to FY 2019-20 (between 1st Apl’2015 & 31st March’2020) against order issued by Power utilities owned and controlled by Central or State Govt. or PSUs or Govt. organizations. Complete order copy along with annexure containing bill of quantity/ scope of work etc shall be invariably submitted in support of technical experience criteria of PQR. **The date of order should not be older than 7 years from the date of issue of NIT of the instant tender.**
 - (ii) Self attested copy (by authorised signatory of the tender) of performance certificate of corresponding work order (for which orders have been furnished) for successful commissioning & satisfactory operation of the above transmission for a period of one year (from the date of commissioning) as on the date of issue of NIT of instant tender, indicating date of commencement of work and date of commissioning / charging of the Transmission line , duly issued by the concerned Power utilities owned and controlled by Central or State Govt. or PSUs or Govt. organizations in the name of participating bidder.
- 7) The sole bidder / both partners of JV bidder should submit Certificate as per annexure-43 as defined in Ministry of Finance, Government Of India’s order no. F.No.6/18/2019-PPD Dtd. 23.07.2020 (Annexure-42-a) read with amended order No.18/37/2020-PPD Dtd.08.02.2021 (Annexure-42-b).

B) Documents in respect of other eligibility requirement:-

- i. Copy of Valid 'A' class Electrical Contractor License issued by CG anugyapan Mandal/ CG state licensing board in the name of sole bidder / **lead partner** of the joint venture/ consortium **or** an undertaking to submit 'A' class electrical contractor license issued by C.G. Anugyapan Mandal / CG State licensing Board within 30 days after issue of LOA, by the sole bidder or lead partner of the joint venture/consortium.
- ii. Copy of EPF code number/ EPF registration No. allotted by EPF Commissioner in the name of the sole bidder / **lead partner** of the joint venture / consortium.
- iii. **Pre-contract Integrity pact** in prescribed format in Annexure A-31 on non judicial stamp paper worth Rs 300/- duly signed by legally authorized signatory of sole bidder or lead partner of the joint venture/consortium.
- iv. In case of JV, an Undertaking entered into, signed by the Joint Venture/Consortium partners, in proforma A-36 (form of undertaking by the Joint Venture Partners) on Non-judicial stamp paper worth Rs.100/- duly attested by Public Notary with seal and Rs.1/- revenue stamp affixed thereon indicating joint and several liabilities among both the parties in case of Joint Venture/Consortium.

The non-judicial stamp paper shall be purchased in the name of Joint Venture and the date of purchase should not be later than six months of date of execution of the Undertaking. The Undertaking shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

- v. In case of JV, an agreement for authorizing one partner to act as "Lead partner" in proforma A-37 (form of power of attorney for Joint Venture) signed by legally authorized signatories of both the partners on non-judicial stamp paper worth Rs.100/- duly attested by Public Notary with seal and Rs. 1/- revenue stamp affixed thereon in case of Joint Venture/Consortium.

The non-judicial stamp paper shall be purchased in the name of Joint Venture and the date of purchase should not be later than six months of date of execution of the Agreement. The Agreement shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

- vi. Bidder shall also furnish experience (as prescribed in Annex.-15 & Annex.-16) in support that the bidder has fabricated & supply of towers and erection & supply of all the material in respect of 220 KV DCDS & DCSS lines.

The bidder shall also furnish the certificate issued by Chartered Accountant for tower manufacturing capacity for the FY 2017-18, 2018-19 & 2019-20.

- vii. Power of attorney issued to legally authorized signatory for this tender should be submitted with the TC bid.
- viii. Detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five financial years (counted from the date of bid submission) shall be furnished in prescribed Annexure A-20 by sole bidder / Lead partner as well as other partner of the JV.
- ix. **Vital document to be submitted with the T/C bid:** - Duly filled in “Check list” in Annexure A-32 (a) & A-32(b) and “Questionnaire” in Annexure A-10 attached with this tender document, indicating Name of organisation with address, Turnover details.

-----End of Section - I-----

SECTION- II

GENERAL CONDITIONS OF CONTRACT

2.01 DEFINITION OF TERMS:-

In writing these General Condition of Contract, the specification and bill of quantity, the following words shall have the meaning hereby indicated, unless there is something in the subject matter content inconsistent with the subject.

- “CSPTCL.” shall mean the CHHATTISGARH STATE POWER TRANSMISSION CO. LTD. represented through the Chief Engineer (P&P), Raipur.
- The purchaser/owner/employee shall mean the CHHATTISGARH STATE POWER TRANSMISSION CO. LTD. (CSPTCL).
- “The Engineer In Charge” shall mean the Engineer or Engineers authorized by the ED/CE (P&P) for the purpose of this contract.
- “CSPTCL Engineer” shall mean an Engineering person or personnel authorized by the CSPTCL to supervise and inspect the material and construction of the Line.
- “The Contractor” shall mean the successful bidder awarded with the contract or their successors and permitted assigns.
- “Contract Price” shall mean the sum named in or calculated in accordance with the provisions of the contract as the contract price.
- “General Conditions” shall mean these General Conditions of Contract.
- “Specification” shall mean the specification annexed to these General Conditions of Contract and shall include the Schedules and drawings attached thereto or issued to the contractor as well as all samples and patterns, if any.
- “Tower” shall mean the design and type tested tower to be supplied by the contractor.

2.02 CONTRACT DOCUMENT:-

The term “Contract” shall mean and include the General Conditions, specifications, Annexures, drawings, work orders issued against the contract Annexures of price or the final general conditions, any special conditions applying to the particular contract specification and drawings and agreement to be entered into. Terms and conditions not here in defined shall have the same meaning as assigned to them in the Indian Contract Act falling that in the C.G. Act.

2.03 MANNER OF EXECUTION: -

- a) The manner of execution shall be such that the supply of materials reach the site in a phased manner as per the site progress after due approval from this office. Erection of the 220 KV LINE shall be carried out in an approved manner as outlined in the technical specification or where not outlined, in accordance with latest relevant Indian Standard Specification, to the reasonable satisfaction of the Engineer.
- b) The contractor shall within 15 days after the date of acceptance of letter of intent submit to the Engineer, a detail program for the execution of work for his consent. The contractor shall whenever required by the Engineer also provide in writing for

his information if general description of the arrangements and methods which the contractor proposes to adopt for the execution of the work.

- c) If at any time it should appear to the Engineer that the actual progress of works does not conform to the program to which consent has been given under **clause 3.05 & 3.09**, the contractor shall produce at the request of the Engineer a revised program showing the modifications to such program necessary to ensure completion of the works within the time of completion.

2.04 VARIATION, ADDITIONS & OMISSIONS:-

CSPTCL shall have the right to alter, amend, omit, or otherwise vary the quantum of work by notice in writing to the contractor. The contractor shall carry out such variation in accordance with the rates specified in the contract so far as they may apply. In case of requirement of material(s) which is not included in the price schedule and rates are not available, an offer for the rates from the contractor shall be obtained. A committee shall be formulated after obtaining competent approval, to examine the reasonability of the rates offered by the contractor. The recommendation of the committee shall then be put up for competent approval and bills shall be processed/admitted on the basis of rates so decided.

2.05 INSPECTION DURING ERECTION:

The Engineer In Charge or his authorized representative(s) shall be entitled at all reasonable times to inspect and supervise and test the materials / works of Lines. Such inspection will not relieve the contractor from their obligations under this contract.

2.06 CONTRACTORS DEFAULT LIABILITY:

The CSPTCL may upon written notice of default to the contractor terminate the contract in circumstances detailed here under:-

(I) If, in the judgment of CSPTCL, the contractor fails to

- (i) Complete the contractual formalities within the time specified in the contract agreement or within the period for which extension has been granted by CSPTCL to the contractor and / or

(ii) Comply with any of the provisions of this contract.

CSPTCL under the provisions of this contract shall take one or more of the following penal actions:-

- (a) Terminate the contract
- (b) Forfeiture of security deposit, if available or EMD.
- (c) Debar the firm for future business with CSPTCL for a period of two years from the date of issue of letter to this effect.
- (d) This debarring may be applicable in respect of other Chhattisgarh State Power Companies also as may be decided by their management.

(II) In case the contractor fails to commence the work within the reasonable period as decided by CSPTCL or fails to complete the works within the contractual completion period or the progress is not commensurate with the time period provided for completion of entire project or within a period for which extension has been granted by CSPTCL, one or more of following penal actions may be taken by CSPTCL against the contractor.:-

- (a) Terminate the contract.
- (b) Forfeiture of security deposit, if available or EMD.
- (c) Debar the firm for future business with CSPTCL for a period of two years from the date of issue of letter to this effect.
- (d) This debarring may be applicable in respect of other Chhattisgarh State Power Companies also as may be decided by their management.
- (e) The payment of pending RA bills of the instant contract shall be withheld.

(f) The payment of pending RA bills of the other running contracts shall also be withheld.

(III) In case the work of construction of line is not completed in accordance to relevant clause of the tender “completion of work” and CSPTCL does not terminate the contract, the contractor shall continue to execute the work, in which case he shall liable to CSPTCL for deduction of liquidated damages for delay as per relevant clause of this contract until the line is completed.

2.07 FORCE MAJEURE:

The contractor shall not be liable for any penalty for delay or for failure to perform the contract for reasons of FORCE MAJEURE such as acts of God, acts of public enmity, act of Government, cyclones, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes provided that the contractor shall within 10 (ten) days from the beginning of such delay notify the CSPTCL in writing of the cause of delay and shall also submit evidences in this regard. The CSPTCL shall verify the facts and grant such time extension as facts justify.

If progress is delayed at any time during the term or extended term of this contract by strikes, lockouts, fire accident, delay in approval of drawings, ROW issues, force majeure conditions or any cause whatsoever beyond the control of the contractor, a reasonable extension of time shall be granted.

2.08 REJECTION OF WORKS:

In the event of any of the material supplied/work done by the contractor is found defective in material or workmanship or otherwise not in conformity with the requirement of this contract specification, the CSPTCL shall either reject the material and/or work and request the contractor to rectify the same. The contractor on receipt of such notices rectify or replace the defective material and rectifies the work, free of cost. If the contractor fails to do so the CSPTCL may:

- a) As its option replace or rectify such defective materials and/or works and recover the extra cost so involved from the contractor plus fifteen percent from the contractor and/or terminate the contract for balance work/supplies with enforcement of penalty as per contract.
- b) Defective materials/workmanship will not be accepted under any conditions and shall be rejected outright without compensation. The contractor shall be liable for any loss / damage sustained by CSPTCL.

2.09 JURISDICTION OF THE HIGH COURT OF CHHATTISGARH:

Suits, if any, arising out of this contract shall be filed by either party in a Court of Law to which the jurisdiction of the High Court of Chhattisgarh extends.

2.10 CONTRACTORS RESPONSIBILITY:

Notwithstanding anything mentioned in the specification or subsequent approval or acceptance of the Line by CSPTCL, the ultimate responsibility for satisfactory performance of the Line shall rest with the contractor.

2.11 NON-ASSIGNMENTS:

The contractor shall not assign or transfer the work orders issued as per this contract or any part thereof without the prior approval of CSPTCL.

2.12 CERTIFICATES NOT TO AFFECT RIGHTS OF CSPTCL:

The issuance of any certificate by CSPTCL or any extn. of time granted by CSPTCL shall not prejudice the rights of CSPTCL in terms of the contract not shall this relieve the contractor of his obligations for due performance of the contract.

2.13 SETTLEMENT OF DISPUTES:

- a) Except as otherwise specifically provided in the contract, all disputes concerning question of fact arising under the contract shall be decided by CSPTCL provided a written appeal by the contractor is made to CSPTCL. The decision of CSPTCL shall be final to the parties hereto.
- b) Any disputes or difference including those considered as such by only one of the parties arising out of or in connection with this contract shall be to the extent possible be settled amicably between parties. If amicable settlement cannot be reached then all disputes issues shall be settled by Arbitration as provided in this contract.

2.14 ARBITRATION:-

- i) No dispute or difference arising between the contractor and the Owner under or relating to or in connection with the Contract shall be referred to Arbitration unless an attempt has first been made to settle the same amicably.
- ii) Where any dispute is not resolved amicably then such disputes shall be referred to & settled by Arbitration under and in accordance with the provisions of the Arbitration and Conciliation Act 1996 and any statutory modification thereof, by three Arbitrators. One to be appointed by each party and the third to be appointed by the two Arbitrators appointed by the parties at the commencement of Arbitration proceedings and falling agreement between them, in accordance with said Act, the third Arbitrator so appointed shall act as the presiding Arbitrator. The award shall be final and binding upon the parties. The venue of Arbitration shall be Raipur.
- iii) The language of the arbitration proceedings and of all documents and communications between the parties shall be English. Arbitration award shall be speaking, final and binding.
- iv) Notwithstanding anything to the contrary contained herein the work under the Contract shall continue during the pendency of any disputes or differences in Arbitration proceedings and no payment due from the Owner shall be withheld on account of such proceedings except to the extent which may be in dispute and the Owner shall be entitled to make recoveries of amounts, if any, due from the Contractor, as per the provisions of the Contract.

2.15 LAWS GOVERNING CONTRACT:

The contract shall be constructed according to and subject to the Laws of India and jurisdiction of the High Court of Chhattisgarh.

2.16 LANGUAGE AND MEASURES:

All documents pertaining to the Contract including specifications, Annexures / schedules, notice correspondence, operating and maintenance instructions, drawings or any other writings shall be written in English language. The metric system of measurement shall be used exclusively in this contract.

2.17 CORRESPONDENCE:

- a) Any notice to the contractor under the terms of the contract shall be served by registered mail or by hand to the authorized local representative of the contractor and copy by post to the contractor's place of business.
- b) Any notice to CSPTCL shall be served to the ED/CE(Planning & Projects), CSPTCL, Dangania, Raipur (CG) 492013 in same manner.

2.18 SECRECY:

The contractor shall treat the details of the specification and other documents as private and confidential and they shall not be reproduced without written authorization from CSPTCL.

2.19 SAFETY PRECAUTIONS:

The contractor shall strictly follow, at all stages of erection of steel structures, the stipulations contained in the latest editions of IS-7205 "Indian Standard Safety code for erection of structural steel work".

2.20 ENGAGEMENT OF WORKERS BY CONTRACTOR:-

- a) The contractor shall at his own expense provide or arrange for the provision of footwear for labour doing cement mixing work which the contractor has undertaken to execute under this contract to the satisfaction of Engineer-in-charge.
- b) Whenever demanded by the Engineer-in-charge the contractor shall submit a true statement showing :-
 - i. Number of Labours employed by him on the work
 - ii. Their working hours
 - iii. The wages paid to them, and
 - iv. The accidents that occurred during the working period of which information required stating the circumstances under which they occurred and the extent of damage and injury caused to them. The contractor should intimate all concerned about any accident & take immediate actions as governed by Rules.

Failure to supply such information or supplying materially incorrect statements may amount to breach of contract. The decision of the Engineer-in-charge shall be determining whether a breach has taken place.

- c) In respect of all labours directly employed in the works of the performance of the contractors part of this agreement the contractor shall comply with or cause to be complied with all the rules framed by the Government from time to time for the protection of Health and Sanitary arrangement of the workers employed by the contractors.

2.21 CONTRACTOR TO INFORM HIMSELF FULLY

The contractor shall be deemed to have carefully examined the general conditions of specification, schedules and drawings. If he shall have any doubt as to the meaning of any portion of these general conditions or of the specification, he shall before signing the contract set forth the particulars thereof, and submit them to the Engineer in writing, so that doubt may be removed.

2.22 CONTRACT DRAWINGS:-

- a) The CSPTCL will supply the structural drawing and Bill of Material for Stub & cleat, Stub setting templates of BN-2, BN-30 and BN-60 type tower along with their body extensions.
- b) The CSPTCL will supply all the relevant tower foundation drawings.
- c) The Contractor shall arrange for one number proto-assembly of body extensions / leg extensions to tower type BN-2, BN-30 and BN-60 type for 220 KV line as per site requirement, which shall be inspected by CSPTCL. After successful proto assembly inspection the Contractor shall make reproducible from the given drawings/documents, add the required note for the subject line, change the revision number of the drawing documents and incorporate changes, if required to be made during proto-assembly. The revised drawing/documents (including structural drawings, BOM etc) shall be submitted in four copies and will be finally approved by the CSPTCL.

The mass fabrication shall be taken up from the approved drawings. The overall responsibility of fabricating tower members correctly lies with the Contractor only and the Contractor shall ensure that all the tower members can be fitted while erecting without any undue strain on them.

- d) The drawing for tower accessories like number plate, danger plate, phase plate, anti-climbing device, step bolt, D-shackle etc. shall be prepared by the Contractor as per drawing of CSPTCL and submitted to the CSPTCL, in ten copies, along with one reproducible, for record. These drawings shall be prepared in A4 size only.
- e) All the drawings shall have a proper name plate clearly displaying the name of CSPTCL on right hand bottom corner. The exact format of the name plate shall be handed-over to the successful bidder for incorporation of the same on all the drawings. Also all the drawings shall carry the following statement and shall be displayed conspicuously on the drawing :-

WARNING:-This is proprietary item & design right is strictly reserved with CSPTCL.Under no circumstances this drawing shall be used by anybody without proper permission from the CSPTCL in writing.

- f) The contractor will submit the drawings & GTP of stringing hardwares, GI Nut Bolts, Conductor, OPGW, barbedwire and Disc Insulators etc. of the approved sub-vendor alongwith the type test of Govt. approved test laboratory which should not be older than 5 years.
- g) The Engineer shall signify his approval or otherwise of the drawing submitted by the bidder within a reasonable time generally not exceeding thirty days, from the date of receipt of such drawings.
- h) Within thirty days of the receipt of the contractor of the notification by the Engineer of his approval of such drawings, ten sets of the drawings as approved shall be submitted to the Engineer by the Contractor. One set such drawings, duly approved by

the Engineer shall be returned to the contractor and be thereafter deemed to be the 'Contract Drawings.

- i) The drawings when so approved shall not be departed from in any way whatsoever except by the written permission of the Engineer as hereinafter provided. The drawings approved by the purchaser shall be at liberty to use these drawings / designs in any manner it likes for its future lines.
- j) During the execution of the works, one of the sets of drawings shall be available with the contractor for reference on the site.
- k) The Engineer or his duly authorized representative shall have the right, at all reasonable times to inspect the factory or works of the contractor.

2.23 MISTAKES IN DRAWINGS:- (a) The contractor shall be responsible for, and shall pay for, any alterations of the work due to any discrepancies, errors, or omissions in the drawings or other particulars supplied by him, even if such drawing or particulars have been approved by the Engineer(s). However, such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished to the contractor by the Engineer. The purchaser shall be responsible for drawings and information supplied by the Engineer, and the purchaser shall pay for any alterations of work necessitated by reason of inaccurate information supplied by the Engineer to the Contractor.

(b) Tender specification to override in case of discrepancy with Approved Drawing:- The contractor are required to submit the drawings of the items strictly as per Tender Specifications. However, after approval of drawing at a later stage, if it is detected that due to incorrect/ incomplete/ partially matching drawing with the tender specifications or due to any other reason, the items actually supplied do not fulfill the requirements as per tender specifications the whole lot shall be liable for rejection unless the deviation is specifically approved by CE (P&P).

2.24 PATENT RIGHTS:-In event of any claim or demand being made or action being brought against the purchaser for infringement or alleged infringement of any patent in respect of any material, work, drawing/design or thing used or supplied by the contractor under this contract or in respect of any method using or working by the purchaser on such machine, work, material, drawing/design or thing, the contractor will indemnify the CSPTCL against all costs and expenses arising from or incurred by reason of any such claim. The CSPTCL shall notify the contractor immediately if, any claim is made and that the contractor shall be at liberty if he so desires with the assistance of the CSPTCL, if required, but at the contractors expense, to conduct all negotiations for the settlement of the same or any litigation that may arise there from.

2.25 SUBLETTING OF CONTRACT:-

- a) The contractor shall not without the consent in writing of the Engineer or CSPTCL, assign or sublet his contract, or any substantial part thereof, other than for raw materials, for minor details for any part of the work of which the makers are named in the contract, provided that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.
- b) The activities which can be allowed for subletting are excavation, transportation of materials, backfilling, de-watering, shoring and shuttering and other minor works. The contractor will inform the site engineer in writing about such subletting of works. The fabrication and galvanizing of towers in case of supply will be done in accordance to clause No.1.15 III (ii) and placement of reinforcement steel, concreting, tower erection & stringing in case of construction will be done by the contractor himself by using their own gangs etc.

2.26 QUALITY OF MATERIALS:-The line shall be constructed in the best and the most substantial and the most workmen like manner and with materials of the best or of approved qualities for their respective uses.

2.27 (A) PACKING:-The contractor shall include and provide for securely protecting and packing the material so as to avoid damage in transit under proper conditions, and he shall be responsible for all losses or damage caused or occasioned by the any defect in packing. All materials shall be packed in accordance with packing specifications prescribed by the carriers. Packing or transporting methods not following to these specifications must be got approved by the Engineer or his authorised representative before transportation is made.

All bright parts shall be thoroughly protected from rust during transit. The purchaser will take no responsibility for any damage done to the material en-route to the 'site of work' or 'place of delivery' whichever may be specified.

(B)Transportation :- The successful bidder shall ensure that all the required material for project is dispatched to site through vehicles within their permissible load carrying capacity sanctioned by Transport Department of State where vehicle is registered.

2.28 DELIVERY:-The contractor shall quote price for the supply and erection of the material, equipment, and machinery covered by the purchaser specification.

2.29 FENCING, LIGHTING AND APPROACH ROAD:-The contractor shall be responsible for the proper fencing, guarding, lighting and watching of all works comprised in the contract and for the proper provision of temporary roadways, footways, guards and fences as far as the same may rendered necessary by reason of the work for the accommodation and protection of foot passengers or other traffic and of the owners and occupiers of adjacent property and of the public.

2.30 POWER TO VARY OR OMIT WORKS:-

No alteration, amendments, omission, additions, suspensions, or variations of the work(hereinafter referred to as 'Variation') under the contract as shown by the contract drawings or the specification shall be made by the contractor except as directed in writing by the Engineer, but the Engineer shall have full power, subject to the provision, hereinafter contained, from time to time during the execution of the contract by notice in writing to instruct the contractor to make such variation without prejudice to the contract and the contractor shall carry out such variations and be bound by the same conditions, as far as applicable as though the said variations occurred in the specification. If any suggested variations would, in the opinion of the contractor, if carried out prevent him fulfilling any of his obligations or guarantees under the contract, he shall notify the Engineer thereof in writing, and the Engineer shall decide forthwith whether or not the same shall be carried out and if the Engineer confirms his instructions, the contractor's obligations and guarantees shall be modified to such an extent as may be justified. The difference of cost if any, occasioned by any such variation shall be added to or deducted from the contract price as the case requires. The amount of such difference, if any, shall be ascertained and determined in accordance with the rates specified in the schedule of prices, so far as the same may be applicable, and where the rates are not contained in the said schedules, or are not possible, the same may be settled by the Engineer and contractor jointly. But the purchaser shall not become liable for payment of any change in respect of any of the variations, unless the

instructions for the performance of the same shall have been given in writing by the Engineer.

In the event of the Engineer requiring any variations, such reasonable and proper notice shall be given to the contractor as will enable him to make his arrangements accordingly and in case where goods or materials are already prepared, or any designs, drawings or patterns made or work done that required to be altered, a reasonable sum in respect thereof shall be allowed by the Engineer.

Provided however, that no variation which involves an increase or decrease of the total price payable hereunder be more than 15 percent shall be made with out the previous consent in writing of the contractor. In case in which the contractor has received instructions from the Engineer as to carrying out the work which either then or later will, in the opinion of the contractor, involve a claim for additional payment, the contractor shall, as soon as reasonably possible after the receipt of the instructions aforesaid, advise the Engineer to that effect.

2.31 NEGLIGENCE:-

If the contractor shall neglect to execute the work with due diligence and expedition, or shall refuse or neglect to comply with any reasonable orders given to him in writing by the Engineer in connection with the work , or shall contravene the provisions of the contract, the CSPTCL may give seven days notice, in writing, to the contractor, to make good the failure, neglect, or contravention complained of. Should the contractor fail to comply with the notice within a reasonable time from the date of service thereof in the case of a failure, neglect, or contravention capable of being made good within that time, or otherwise within such time as may be reasonably necessary for making it good, then and in such case the CSPTCL shall be at liberty to employ other workman, and forthwith perform such work as the contractor may have neglected to, or if the CSPTCL shall think fit, it shall be lawful for him to take the work wholly, or in part, out of the contractor's hands and re-contract at a reasonable price with any other persons, or provide any other materials, tools, tackles or labour for the purpose of completing the work or any part thereof. In that event the CSPTCL shall, without being responsible to the contractor for fair wear and tear of the same, have the free use of all the materials, tools, tackles, construction plant or other things which may be on the site, for use at any time in connection with the work, to the exclusion of any right of the contractor over the same, and the CSPTCL shall be entitled to retain and apply any balance which may be otherwise due on the contract by him to the contractor or such part thereof as may be necessary to the payment of the cost of executing such work as aforesaid.

If the cost of executing the work as aforesaid shall exceed the balance due to the contractor, and the contractor fails to make good the deficit, the said materials, tools, tackle, construction plant or other things, the property of the contractor may be sold by the CSPTCL, and the proceeds applied towards the payment of such difference and the cost of and incidental to such sale. Any outstanding balance existing after crediting the proceeds of such sale shall be paid by the contractor on the certificate of the Engineer, but when all expenses costs and charges incurred in the completion of the work are paid by the contractor all such materials, tools, construction plant or other things remaining unsold shall be removed by the contractor.

2.32 DEATH BANKRUPTCY ETC.

If the contractor die or commit any act of bankruptcy, or being corporation, commence to be wound up except for reconstruction purposes or carry out its business under receiver, the executors, successors, or other representative in law of the estate of the contractor or any such receiver, liquidator or any person in whom the contractor may become vested, shall forthwith give notice thereof in writing to the CSPTCL for one month, during which he shall take all reasonable steps to prevent a stoppage of works and shall have the option of carrying out the contract subject to his or their providing such guarantee as may be required by the CSPTCL but not exceeding the value of the work for time being remaining-unexecuted. In the event of stoppage of the works, the period of option under this clause shall be fourteen days only. Provided that, should be above option not be exercised, the contract may be terminated by the CSPTCL by notice in writing to the contractor, and the same power and provisions reserved to the CSPTCL in the last proceeding clause on taking of the work out of the contractor's hands shall immediately become operative.

2.33 INSPECTION & TESTING:-

- (a) The Engineer and his duly authorized representative, shall have, at all reasonable times, access to the contractor's premises or works, and shall have the power at all reasonable times, to inspect and examine the materials and workmanship of the plant/Line during its manufacture, construction or erection thereof for which all the reasonable necessary assistance shall be rendered by the contractor without any extra commitment and if part of the material is being manufactured or erected on other premises or works, the contractor shall obtain permission for the Engineer and for his duly authorized representative to inspect as if the materials were manufactured or erected on the contractor's own premises or works.

The Engineer shall on giving seven day's notice in writing to the contractor setting out any grounds of objection which he may have in respect of the work, be at liberty to reject all or any materials or workmanship the subject of any of the said grounds of objection, which in his opinion are not in accordance with the contract or are in his opinion defective for any reason whatsoever. Such notice shall be sent to the contractor within reasonable time after the ground upon which such notice is based have come to the knowledge of the Engineer. Unless specifically provided otherwise, all tests as per relevant ISS shall be made at the contractor's works before transportation.

The contractor shall give the Engineer 15 (Fifteen) days clear notice of any material being ready for testing and the Engineer or his said representative shall, attend at the contractor's premises or works within a reasonable time. **The contractor should ensure that the material is delivered at site stores within 21 days of clearance. In case material is not received within 21 days from date of issue of Dispatch instructions, the material is liable for re-inspection at the cost of contractor.**

- (b) **Fake inspection call:** In case, the material is not offered for inspection on the date of inspection offered by the firm, due to any reason the firm shall be required to remit a sum of Rs.5,000/- or actual expenditure incurred in the visit of the inspector, whichever is more.

- 2.34 TEST AT CONTRACTOR'S PREMISES:-** In all cases where the contract provides for tests, whether at the premises or works of the contractor or of any sub-contractor, the contractor except where otherwise specified shall provide, free of charge, such labour,

materials, electricity, fuel, water, stores, apparatus and instruments as may reasonably be demanded necessary to carry out efficiently such tests of the material in accordance with the contract, and shall give facilities to the Engineer or his authorized representative to accomplish such testing.

If specific tests other than those specified in the relevant ISS/contract are required by the CSPTCL, the charges for such tests shall be borne by bidder.

When the tests have been satisfactorily completed at the contractor's or sub-contractor's premises or works, the Engineer or his authorized representative shall issue a test certificate to that effect. However, no material shall be transported before such test certificate has been approved and dispatch instructions issued by this office. The satisfactory completion of these tests or the issue of this certificate shall not abide the CSPTCL to accept the material so passed for transportation, if on further tests after erection it is found not to comply with the specification.

2.35 DELIVERY OF MATERIALS AND DISPATCH INSTRUCTIONS:-

Materials may be supplied based on the field requirement so as to avoid blocking of inventory. On receipt and verification of test certificates, CSPTCL will issue a clearance for dispatch of inspected material. No material shall be dispatched before receipt of such dispatch instruction in writing.

2.36 ACCESS TO SITE AND WORK ON SITE:-

Suitable access to the site shall be afforded to the contractor by the CSPTCL in reasonable time. The day to day minor problem like free access to the site and other local problems would be solved by the contractor at his own cost. However, the CSPTCL would extend necessary cooperation/assistance in this respect. The necessary road permits required for transportation of men/material would be arranged by the contractor at his own cost.

In the execution of the work no persons other than the contractor, or his duly appointed representative, subcontractors and workman shall be allowed to do work on the site, except by the Special permission, in writing of the Engineer or his representative, but access to the works at all times shall be accorded to the Engineer and his representative, and other authorized official or representatives of the purchaser.

Nevertheless, the contractor shall permit the execution of the work by other contractors or tradesman whose name shall have been previously communicated in writing to the contractor by the Engineer, and afford them every facility for the execution of their several works simultaneously with his own. The contractor shall provide all the skilled and unskilled labour necessary for the erection of work included in the contract.

2.37 ENGINEER'S SUPERVISION:-

All the works shall be carried out under the direction and to the reasonable satisfaction of the Engineer. If supervision of erection or complete erection be included, the contractor shall be responsible for the correctness of the position, levels, and dimensions of the works according to the drawings, notwithstanding that he may have been assisted by the Engineer in setting out the same.

2.38 ENGINEER'S DECISIONS:-

In respect of all matters which are left to the decision of the Engineer, including the granting of or withholding of certificates, the Engineer shall, if required so to do by the contractor, give in writing a decision thereon, and his reasons for such decision.

2.39 CONTRACTOR'S REPRESENTATIVE AND WORKMEN:-

The contractor shall employ at least one competent representative, whose name or names shall have previously been communicated in writing to the Engineer by the contractor, to supervise, the erection of the line and the carrying out of the work. The said representative, of if more than one shall be employed, then one of such representatives, shall be present on the site during working hours, and any written orders or instructions which the Engineer or his duly authorized representative whose name shall have been communicated in writing to the contractor shall be deemed to have been given to the contractor.

The Engineer shall be at liberty to object to any representative or person employed by the contractor in the execution of or otherwise about the works who shall misconduct himself or be incompetent or negligent, and the contractor shall remove the person so objected to upon the receipt from the Engineer of notice in writing requiring him so to do and shall provide in his place a competent representative at the contractor's expense.

2.40 LIABILITY FOR ACCIDENTS AND DAMAGE:-

The contractor shall be entirely responsible for all loss, damage, or depreciation of the line until the line is 'taken over' in accordance with relevant clause of specification.

The contractor shall during the progress of the work, properly cover up and protect the line from injury by expose to the weather, and shall take every reasonable, proper, timely and useful precaution against accident or injury to the same from any cause and shall remain answerable and liable for all accidents or injuries thereto which until the same be, or be deemed to be taken over as per relevant clause of this specification, may arise or be occasioned by the acts or omissions of the contractor or his workman or sub-contractor and all losses and damages to the materials arising from such accidents and injuries as aforesaid shall be made good in the most complete and substantial manner by and at the sole cost of the contractor and to the reasonable satisfaction of the Engineer.

Until the line shall be or be deemed to be taken over as aforesaid, the contractor shall also be liable to indemnify the purchaser in respect of all damage or injury to defective design, work, or material, but not otherwise.

Provided that the contractor shall not be liable under the contract for any loss or profit or loss of contract for any claims made against the CSPTCL not already provided for in the contract, nor for any damage or injury caused by or arising from the acts of the purchaser or of others, of (safe as to damage by fire as hereinafter provided) due to circumstances over which the contractor has no control, nor shall his total liability for loss, damage or injury exceed the total value of the contract.

The contractor shall be deemed to have indemnified and saved harmless the purchaser against all actions suits, claims, demands, cost of expense arising in connection with injuries, suffered prior to the date when the line shall have been taken over as per relevant clause of this specification, herein by person employed by the contractor or his sub-contractor on the works whether under the General Law or under the Workman's Compensation Act, 1923, or any other statute in force at the statute of the contract

dealing with the question of the liability of employers for injuries suffered by employees for injuries suffered by employees and to have taken steps properly to insure against any claim there under.

On the occurrence of an accident which results in the death of any of the workmen employed by the contractor or which is so serious as to be likely to result in the death of any such workman, the contractor shall, within 24 hours of the happening of such accident, intimate in writing to the concerned legal competent authorities as per rules & act enforce under intimation to Engineer in-charge the fact of such accident. The contractor shall indemnify the CSPTCL against all loss or damage sustained by the CSPTCL resulting against all loss or damage sustained by the CSPTCL directly or indirectly including the penalties or fines if any payable by the CSPTCL as a consequence of CSPTCL's failure to give notice to the provisions of said Act in regard to such accidents.

In the event any claims being made or action brought against the purchaser involving the contractor and arising out of the matters referred to and in respect of which the contractor is liable, under this clause, the contractor shall be immediately notified thereof and he shall with the assistance if he so require, of the purchaser, but at the sole expense of the contractor, conduct all negotiations for the settlement of the same or of any litigation that may arise there from. In such case the purchaser shall, at the expense of the contractor, afford all available assistance for any such purpose.

2.41 Clearance of dues of Sub-vendor and observance of Industrial/Labour Law :-

- (i) The main contractor shall furnish list of various agencies/sub-vendors proposed to be engaged for execution of different type of works under scope of this work order to the ED/CE (C&LM) CSPTCL, Raipur and concerned Engineer-In-Charge.
- (ii) Wages and fringe benefits according to the Labour Law / Industrial Law and fixed by concerned District Collectorate as in force during the execution of the work shall have to be paid by contractor or his appointed sub-vendor. It shall be the sole responsibility of the main contractor for observing the prevailing laws and contractor shall be abided for such statutory requirements absolving CSPTCL fully in case of any dispute, if so arises. Notwithstanding above, CSPTCL reserves the right to make direct payment to the sub-vendor / sub-contractor in case of failure of the main contractor to do so within a reasonable time period on whatever ground and deduct from the bills due to the contractor under this contract or any other contract with CSPTCL including his amount of performance / security for adjusting the aforesaid payment.
- (iii) The termination/completion of the sub-vendor's job shall be informed to CSPTCL promptly. The contractor shall furnish a certificate jointly signed by sub-vendor and himself having settled all the dues and liabilities accrued due to sub-vendor's engagement for the execution of tendered work. The B.G. shall be released only after submission of the aforesaid clearance certificate received from all such sub-vendors engaged on execution of tendered work under the scope of this order. The B.G./ final payment shall be released only after submission of aforesaid clearance certificate to the concerned field Division.
- (iv) The contractor shall observe Labour Law/Industrial Law and Wages Law strictly with regard to payment and fringe benefits to be delivered to the labors/workers engaged by the Contractor or his sub-vendor. It shall be the sole responsibility of main contractor for arranging due insurance of personnel / materials to meet out any exigencies. It shall be the sole responsibility of main contractor for observing all the prevailing Laws and CSPTCL shall not be held responsible for any liability / disputes or claim in any way if arises due to non-observance of such Laws. However, the decision of Honorable District Court / appropriate court of law shall

be final and binding on CSPTCL, Contractor and sub-vendor in case of any dispute.

2.42 REPLACEMENT OF DEFECTIVE WORK OR MATERIAL:-

If during the progress of the work the Engineer shall decide and notify in writing to the contractor that the contractor has executed any unsound or imperfect work, or has supplied any materials inferior in quality or quantity to those specified, the contractor on receiving details of such defects or deficiency shall at his own expenses, within seven days of his receiving the notice, or otherwise within such time as may be reasonably necessary for making it good, proceed to alter, reconstruct, or remove such work or supply fresh materials up to the standard of the specification, and in case the contractor shall fail to do so, the purchaser may, on giving the contractor, seven days notice in writing of his intension to do so, proceed to remove the work or materials complained of, and at the cost of the contractor, perform all such work or supply all such materials provided that nothing in this clause shall be deemed to deprive the purchaser or affect any rights under the contract which he may otherwise have in respect of such defects of deficiencies.

2.43 DEDUCTIONS FROM CONTRACT PRICE:-

- (i) All costs, damages or expenses which the purchaser may have paid, for which under the contract the Contractor is liable, may be deducted by the purchaser from any money due or become due by him to the Contractor under the contract or may be recovered by suit or otherwise from the Contractor as an arrear of land revenue.
- (ii) Recoveries For Liabilities Against Other Contract/Order:
Any amount recoverable from the successful Bidder against earlier contracts/orders placed by the CSPTCL on the Bidders shall be adjusted from payment(s) due against this contract that may be awarded against this specification.

2.44 CERTIFICATE:-

(i) CERTIFICATE OF ENGINEER:-

Every application to the Engineer for a certificate must be accompanied by a detailed invoice (in duplicate), setting forth in the order of the schedule of prices, particulars of the work executed and/or material ready for dispatch on the date of claim, and the certificate that such material and work is in accordance with the contract, shall be issued by the Engineer within a reasonable time.

The Engineer may, by any certificate make any correction or modification in any previous certificate which shall have been issued by him and payments shall be regulated and adjusted accordingly.

(ii) CERTIFICATE NOT TO AFFECT THE RIGHTS OF THE CSPTCL OR CONTRACTOR:-

No certificate of the Engineer on account nor any sum paid on account by the CSPTCL, nor any extension of time for the execution of the works by the contractor under the powers granted by **clause 2.51** shall affect or prejudice the rights of purchaser against the contractor, or relieve the contractor of his obligations for the due performance of contract, or be interpreted as approval of the work done or of the

materials supplied and no certificate shall create liability in to the CSPTCL to pay for alterations, amendments, variations or additional work not ordered in writing by the Engineer, or discharge the liability of the contractor for the payment of damages whether due, ascertained, or certified or not or of any sum against the payment of which he is bound to indemnify the CSPTCL, not shall any such certificate nor the acceptance by him of any sum paid on account or otherwise affect or prejudice the rights of the contractor against the CSPTCL.

2.45 SUSPENSION OF WORKS:- The CSPTCL shall not pay to the contractor any expenses, arising from suspension of the works for any reason whatsoever.

2.46 RESPONSIBILITY OF CONTRACTOR:-

The contractor shall be responsible for carrying out the works covered under the scope of the contract according to the specification, order. For example, the towers should be erected according to the position indicated in the approved profiles and the selection of foundation in various types of soils should be done based on the soils actually encountered in the foundation pit. Deviations, if any, from the approved/specified conditions shall be brought to the notice of C E (P&P) CSPTCL, Dangania, Raipur (CG) 492013 through the site Engineer, before taking up the work and his decision shall be final and communicated through site Engineer. If at a later date, it is found that the contractor has carried out some work, not according to the specifications, and without taking specific approval, then in that case, all the payments made to the contractor for carrying out such works shall be recovered and the contractor will have to rectify the same at the rate indicated in the order for carrying out such works without extn. of time.

2.47 LIQUIDATED DAMAGE FOR DELAY IN COMPLETION:-

- a. If the contractor fails to perform the work within the specified period given in the order or extension granted thereof, with respect to successful completion of testing & commissioning of transmission line, the Contractor shall pay to CSPTCL as liquidated damages, a sum of half percent (0.5%) of the contract price (supply & erection) for each calendar week or part thereof. However, the amount of liquidated damages for the Contract shall be limited to a maximum of five percent (5%) of the total contract price (supply & erection) for completed and uncompleted portion of the line.
- b. The payment or deduction of such damages shall not relieve the contractor from obligations to complete the works, or from any of other obligations and liability under the contract.
- c. **Pending rectification works :-** The OIC of the work shall intimate the contractor all the defects / shortcomings noticed in the line within 15 days of the commissioning/energization of line. All the pending rectification works shall be completed by contractor within three months of issue of such letter. In case of noncompliance of the observations in this time frame by the contractor, the pending works shall be got completed/executed by CSPTCL from other agency(ies) and deduction shall be made from contractor's bill as decided by a committee of officers of CSPTCL.

2.48 REJECTION OF DEFECTIVE WORK:-

If the complete line, or any portion thereof, before it is taken over as per relevant clause of this specification, be defective, or fails to fulfill the requirements of the contract, the Engineer shall give the contractor notice setting forth particulars of such defects or failure, and the contractor shall forthwith make the defective material good, or alter the same to make it comply with the requirements of the contract. Should he fail to do so within a reasonable time, the purchaser may reject and replace at the cost of the contractor, the whole or any portion of the material, as the case may be which is defective or fails to fulfill the requirements of the contract. Such replacement shall be carried out by purchaser within a reasonable time and at a reasonable price and where reasonably possible, to the same specification and under competitive conditions. The contractor's full and extreme liability under this clause shall be satisfied by the payment to the purchaser of the extra cost, if any, of such replacement delivered and or erected as provided for in the original contract. Such extra cost being the ascertained difference between the prices paid by the purchaser, under the provisions above mentioned, for such replacement and the contract price for the material so replaced including the repayment of any sum paid by the purchaser to the contractor in respect of such defective material. Should the purchaser not so replace the rejected material within reasonable time, the contractor's full and extreme liability under this clause shall be satisfied by the repayment of all moneys paid by the purchaser to him in respect of such material, in the event of such rejection, the purchaser shall be entitled to the use, of the material in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain other replacement material, during the period the rejected material is used commercially the contractor shall be entitled to a reasonable sum as payment for such use.

2.49 TAKING OVER :-

When all performance tests called for by the specification have been successfully carried out before transportation, the material shall be accepted and taken over when it has been satisfactorily put into operation on site, or within one month of its being ready to be put into operation, whichever shall be the earlier and the Engineer shall forthwith issue a taking over certificate.

The Engineer shall not delay the issue of any taking over certificate contemplated by this clause on account of minor defects in the material which do not materially affect the commercial use thereof provided that the contractor shall undertake to make good the same in due course.

2.50 MAINTENANCE:-

- a) For a period of 24 (Twenty Four) calendar months commencing immediately upon the satisfactory completion of the final tests at site and taking over of the line, the contractor's liability shall be limited to the replacement (supply and re-erection) of any defective parts that may develop in transmission line of his own manufacture or those of his sub-contractors approved under **clause 2.06** (Contractor's default liability) under the conditions provided for by the contract under proper use and arising solely from faulty design, materials, or workmanship.

- b) If it becomes necessary for the contractor to replace or renew any defective portions of the material under this clause, the provisions of this clause shall apply to the portions of the material so replaced or renewed until the expiration of six months from the date of such replacement or renewal or until the end of the above mentioned period of twenty four months which ever may be later. If any defects be not remedied within a reasonable time, the purchaser may proceed to do the work at the contractor's risk and expense, but without prejudice to any other rights which the purchaser may have against the contractor in respect of such defects.
- c) The contractor shall bear reasonable cost of minor repairs carried out on his behalf at site.
- d) At the end of the maintenance period, the contractor's liability ceases. In respect of goods not covered by this clause, the purchaser shall be entitled to the benefit of any guarantee given to the contractor by the original supplier or manufacturer of such goods.

2.51 REGULATION OF LOCAL AUTHORITIES:-

The purchaser shall, throughout the continuance of the contract and in respect of all matters arising in the performance thereof, serve all notices and obtain consents, way leaves, approvals and permission required in connection with the regulations and bye-laws of the local or other authority which shall be applicable to the works, However, the contractor shall obtain all the necessary licenses/permissions as per central/state/local statutory bodies at his cost.

All works shall be executed in accordance with the Indian Electricity Rules, 1956, and any statutory modifications thereof, wherever they are applicable, unless otherwise agreed to in writing by the Engineer.

2.52 CONSTRUCTION AS PER CONTRACT ACT:-

The contract shall be in all respects be construed and operate as a contract as defined in Indian Contracts Act, 1872, and all payments there under shall be made in Indian rupee unless otherwise specified.

2.53 HEADINGS:-

The subject headings of any clause thereof shall not, in any manner whatsoever, affect the interpretation of such clause.

2.54 CONTRADICTIONARY STATEMENT IN THE TECHNICAL & COMMERCIAL BID :-

In case the bidder makes contradictory statement in the Technical & Commercial Bid, CSPTCL will have full right to interpret / take that statement into consideration which will be in the interest of CSPTCL.

-----End of Section-II-----

SECTION – III

GENERAL CONDITIONS OF CONTRACT (COMMERCIAL)

3.01 COMPLETION OF WORK:

- a) Time being the essence of contract, the work of construction of **220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan (approx. 24 km.)** covered under this specification **should be completed in 18 (Eighteen) calendar months including rainy season from the date of order.** The contractor shall ensure to complete the work of line within aforesaid stipulated period.
- b) **Taking over:**-Upon receipt of intimation about completion of erection of the Line and after inspection, CSPTCL Engineer in charge shall issue a taking over certificate in which he shall certify the date on which the Line has been so taken over. This certificate shall be issued within 30 days of the intimation from the contractor.

The issuance of taking over certificate shall in no way relieve the contractor of his responsibility for the satisfactory operation of the Line in terms of the specifications.

3.02 MATERIAL TO BE SUPPLIED BY CONTRACTOR:

All the materials like G.I. Towers & its associated accessories; ACSR Conductor, OPGW, stringing hard wares, Disc Insulators etc. shall be supplied by the Contractor to site stores without any extra cost to the CSPTCL.

3.03 TERMS OF PAYMENT:-

3.03.1 The payment on running bills will be allowed in the following manner to relieve the contractor from financial hardship if any, so as to facilitate him for timely completion of the work :-

- a) **SUPPLY :-** The contractor shall present at the end of each calendar month a bill for the materials supplied duly certified by CSPTCL Engineer in charge, during the month at the charges/rates accepted. 90% value of the material supplied every month shall be paid within a period of fifteen (15) days from the date of receipt of bills in Dn. office. Balance 10% shall be retained by the CSPTCL and shall be released after six months on satisfactory completion and handing over of the completed Line by the contractor.
- b) **CONSTRUCTION: -** The contractor shall present at the end of each calendar month a bill for the works completed, inspected and duly certified by CSPTCL Engineer in charge, during the month at the charges/rates accepted. 90% value of the work done every month shall be paid within a period of fifteen (15) days from the date of receipt of bills in Dn. office. Balance 10% shall be retained by the CSPTCL and shall be released after six months on satisfactory completion and handing over of the completed Line in all respect by the contractor.

3.3.2 (i)ADVANCE PAYMENT: - If requested by the contractor, CSPTCL may at its option grant an advance payment of maximum 10% of contract value after obtaining approval of competent authority. "The advance shall attract interest at the rate notified by PFC for capital projects of STU's in category under which CSPTCL falls plus a margin of 2%. The interest shall be charged monthly outstanding advance. Presently, CSPTCL is rated as "A⁺" and rate notified by PFC for capital works of "A" category STUS is 11.25% p.a. which implies that **applicable interest rate at present would be 13.25%** to be charged on monthly basis". Separate order shall be issued to this effect. The contractor will furnish an unconditional and irrevocable Bank Guarantee from a Nationalized / Scheduled Bank in favour of CSPTCL for an amount equal to

the advance granted plus interest up to the completion period calculated on it. The bank guarantee shall be initially valid till six months (180 days) after expiry of completion period and shall be extended from time to time 180 days as required. This BG may be reduced on pro-rata on quarterly basis based on contractor's request. The advance, if granted, shall be recovered from the running bills along with accrued interest as per CSPTCL's terms and conditions which shall be brought in the order for advance payment. The bank guarantee shall be released on recovery of entire amount of advance granted plus interest.

- (ii) **Procedure for reduction in the Advance Payment Security guarantee.** The BG furnished towards advance payment may be considered to be reduced in every three months in case the validity of bank guarantee is more than one year. It should be clearly understood that reduction in value of advance Bank Guarantee shall not in any way dilute the contractor's responsibilities under the contract including in respect of the facilities for which reduction in the value of securities is allowed.
- (iii) **DEDUCTION OF ADVANCE PAYMENT:-** The advance payment with interest accrued on the advance made to the contractor will be adjusted against their running bills. The adjustment of advance will be done from the running bills of the contract proportionately to the extent of 20% in supply of materials and 20% on erection charges only till the total advance plus interest gets adjusted.

3.04 SOURCES OF MATERIALS / ASSOCIATION WITH OTHER FIRMS:

As the specification covers the arrangement of material for structures, fabrication, galvanizing and delivery of G.I. towers including bolts and nuts, spring washers, danger board, number plate, phase plate, Galvanized Earthing rod with clamps and anti-climbing arrangement with barbed wire, conductor, OPGW, stringing hardware and disc insulators etc. and complete erection of the transmission line indicated in the relevant section (part 1 of this specification) including the supply of cement and reinforcement steel by the bidder, the source of procurement of various tower accessories, cement and reinforcement steel must be indicated by the bidder in the relevant **Annexure-18**. In case if the CSPTCL wants any change in the source of supply of above material, then the bidder will change the source accordingly. Further if the bidder desires to change the source of procurement of diligence any item, then he will have to take prior approval of the CSPTCL.

3.05 PROGRAMME CHART AND PROGRESS REPORT:

- i. The time and date of completion of the work as stipulated in the relevant clause and accepted by the bidder shall be deemed to be essence of the contract. The contractor shall organize his resources and perform his work so as to complete it not later than the date agreed to. The time for completion of the works contracted for shall be reckoned from the date of detail order.
- ii. The contractor shall submit a detailed Bar Chart calendar date and month-wise for completion of work consisting of adequate number of activities covering various key phases of the works such as procurement, manufacturing, transportation and/or field erection activities like survey, soil investigation, excavation, stub setting, erection, stringing activities within 30 (thirty) days from the date of the order. This programme shall also indicate the programme of supply of towers by the contractor and anticipated inter-phase materials and facilities (to be provided by contractor). Contractor shall discuss the programmes submitted with the CSPTCL and the

agreed programme which may be in the form as submitted or in revised form in line with outcome of discussion shall be deemed to be a part of the contract.

- iii. The above programme shall be reviewed periodically and reports shall be submitted by the contractor as directed by the CSPTCL.

3.06 QUALITY ASSURANCE:

Quality Assurance Programme: To ensure that the equipments and services under the scope of this contract whether manufactured or performed within the contractor's works or at his sub-contractor's works or at the CSPTCL's site or at any other place of work are in accordance with the specifications, the contractor shall adopt suitable Quality Assurance Programme (Q.A.P.) to control such activities at all points, necessary. Such programme shall be outlined by the contractor and shall be finally accepted by the CSPTCL after discussions.

Immediately after the placement of order, the contractor shall submit to the CSPTCL the quality assurance plan covering the manufacture and erection activities of the transmission line. The quality assurance plan shall be approved by the CSPTCL.

The contractor shall follow the approved quality assurance plan in true spirit. If desired by the CSPTCL, he shall give access to all the documents and equipments to satisfy the CSPTCL that quality assurance plan (Q.A.P.) is being followed properly.

All materials including the complete structure shall be subjected to the tests before dispatch, as specified in this tender specification.

3.07 TEST AND TEST CERTIFICATES:

The tests to be conducted by the contractor are divided in three categories:-

PROTO TYPE TEST:- These tests should have been conducted as per the drawing & designs of the structures provided by CSPTCL to the contractor. The reports of these tests shall be submitted by the contractor.

ACCEPTANCE TESTS:- These tests shall be conducted as per latest relevant I.S.S. / Q.A.P. approved by the CSPTCL on each and every lot finished materials, which is ready for dispatch. These tests shall be conducted in the presence of the CSPTCL's authorized representative.

ROUTINE TESTS:- These tests shall be conducted on raw materials, in process material and finished material in accordance with approved Q.A.P. by the contractor himself. However, the details / documents relating to these tests shall be shown to the CSPTCL's representative during acceptance tests or as and when desired by the CSPTCL.

3.08 COMMENCEMENT OF ACTIVITIES:

Commencement of following activities is subject to prior and specific approval of the items mentioned against each:-

S.No.	Activity	Items for which prior approval is necessary from the CSPTCL.
1	Manufacturing of tower parts	Drawings of various towers and their accessories, bill of materials, quality assurance plan and permission to take up manufacturing of towers.
2	Dispatch of tower materials	Acceptance tests and issue of test certificate approval along with the dispatch instructions.
3	Foundation work	Stub setting template, classification of the foundation.
4	Erection of tower	Quality assurance plan for erection.
5	Stringing of wires	Location-wise Initial and final Stringing chart and stringing method.

3.09 PROJECT MONITORING:

After the placement of order, the contractor in consultation with company (if necessary) shall prepare a detailed time schedule for each activity and relating various activities with each other in chronological sequence as detailed in **Clause No.3.05** above.

Supply of tower material should be done in such a way that various activities including stringing of line are not delayed for want of tower material. Hence tower material should be fabricated and despatched in a sequential way, so that after some initial random lots, only those tower members are supplied, which are necessary to complete the requisite number of towers. It may also be noted that supply of towers should be restricted so as to commensurate with the tower erection work, in order to avoid storage of excess quantity of towers at contractor's site store. It may be noted that the CSPTCL reserves the right to stop payment, dispatches or even inspection of balance tower materials, if it does not meet the above requirement.

The contractors are advised to supply all the materials in accordance with the chronological sequence of the work as per requirement in the field to avoid blocking of inventory.

During the currency of the contract, the contractor shall furnish the following reports to the Engineer:-

Fortnightly progress report (in prescribed formats for the duration from 1st to 15th and 16th to 30/31st i.e. last date of the month) of the various activities of erection of line as well as receipt of various materials at site, indicating scheduled and actual progress during the fortnight as well as cumulative. The progress of tower foundations should also indicate the respective tower footing resistances.

Monthly progress report in the prescribed formats for the supply of tower materials indicating quantity offered for inspection, quantity inspected, quantity cleared, quantity rejected and quantity dispatched.

Any other progress report as desired by the CSPTCL.

The format of the above progress reports shall be intimated to the contractor after the placement of order.

Besides above, a periodical review meeting between contractor and CSPTCL shall be held quarterly to analyze the scheduled and actual progress, targets for the next period and to sort out bottlenecks, if any. The contractor will attend the above meetings along with necessary information in respect of supply and erection activities.

3.10 SPECIAL WORKS:-

CSPTCL shall have the right to alter, amend, omit, or otherwise vary the quantum of work by notice in writing to the contractor. The contractor shall carry out such variation in accordance with the rates specified in the contract so far as they may apply. In case of requirement of material(s) which is not included in the price schedule and rates are not available, an offer for the rates from the contractor shall be obtained. A committee shall be formulated after obtaining competent approval, to examine the reasonability of the rates offered by the contractor. The recommendation of the committee shall then be put up for competent approval and bills shall be processed/admitted on the basis of rates so decided.

3.11 SCOPE (COMMERCIAL TERMS AND CONDITIONS):-

This section of the specification covers supply delivery ex-contractor's stores, unloading and stacking of all types of **220 KV tested towers**, extensions, templates etc. The work shall be carried out as per the details laid down in the specification. The price for works and material covered under scope of this specification shall be furnished by the bidders in prescribed price schedule appended with this specification. The bidder shall quote for complete work of fabrication and galvanizing, delivery etc. for 220 KV Transmission line on turn-key basis.

3.12 SUPPLY OF MATERIALS:-

The supply of fabrication towers to be made by the contractor, shall include structural members like angle sections, gusset plate, pack washers, taper washers, ladder, platform bolts and nuts, spring washers, Galvanized Earthing rod with clamps, danger board, number plates, phase plates, step bolts and anti climbing device including barbed wire and such other items which worked be required for completing the towers in all respect. For manufacturing of these items steel and Zinc will be procured by the contractor.

The supply of hangers/ D shackles for attaching suspension strings and "U" bolts for attaching ground wore suspension assemblies are also included in the scope of supply of tower.

3.13 PROCUREMENT OF STEEL BY THE CONTRACTOR:-

The following provisions shall apply in connection with the procurement of steel by the contractor:-

- (a) The steel used for the fabrication of tower parts, extension templates etc. shall be mild steel of tested quality as per IS : 2062- 2006 or latest revision thereof.

- (b) The bidders should take into account the fabrication wastage while quoting the rates. The CSPTCL shall not accept any liability in connection with the actual wastage of steel during fabrication or otherwise.
- (c) Substitutions, if any, of steel sections of the tower parts by higher size, due to their non-availability or otherwise shall be to the contractor's account. The CSPTCL shall not accept any liability on this account.
- (d) The steel shall generally be procured from the Main Steel Producers. However, section not rolled / available from the main producers, the same could be procured from re-rollers as per quality indicated in (a) above, provided:-
 - (i) Re-rolling or structural steel sections is done from billets / ingots of tested quality.
 - (ii) Re-rolled sections are duly tested as per relevant I.S. It may however be noted that no additional cost shall be payable towards procurement of steel section from re-rollers and the price variation shall be payable as specified in relevant clause of this specification.
- (e) The zinc used for galvanising of fabricated material shall be **electrolytic High Grade Zinc**.
- (f) Only tested steel sections having its yield strength not less than 2550 kg/cm² shall be used.

3.14 RESPONSIBILITY FOR PROCUREMENT OF STEEL AND ZINC:

Procurement of steel required for fabrication of towers such as angles, plates, rods etc. and procurement of zinc for galvanizing shall be done by the contractor. Necessary authorization or help from purchaser to obtain allocation of steel from the main producers will be given on receipt of written request from the contractor in this regard. Similarly for procurement of zinc from HZL if any authorization is needed the same shall be given by the purchaser. However, responsibility for timely procurement of steel/zinc for supply of towers will be that of the contractor and no excuse in delivery will be accepted for delay in receipt of these items in spite of our authorization. The contractor will inform the CSPTCL the source of procurement of steel and zinc and their technical particulars before starting of fabrication.

3.15 RATES:

The prices shall be quoted for supply of various towers, extensions and tower accessories etc. on MT basis. F.O.R. Destination rates must be quoted as under clearly giving break-up of prices in following three elements, otherwise the offers may run the risk of rejection:

- i) Ex-factory / Ex-go down prices inclusive of packing and forwarding.
- ii) All the taxes shall be applicable as per provision of GST Act 2017 relevant for CSPTCL.
- iii) Freight charges for any destination in Chhattisgarh State. The offered freight charges should be on "FIRM" basis only, and should be valid for either road transport or rail transport.

The supply of towers shall include supply of drawings, fabrication and delivery and the rates quoted for supply of towers shall include all charges including cost of steel, fabrication and galvanizing etc. The prices for fabricated material shall include all works relating to fabrication and delivery ex-contractors stores, unloading and staking member-wise in specified area. The quoted prices shall also include the cost of necessary quantity of steel and galvanizing, transit, insurance, freight up to site stores and other indirect charges incurred in connection with supply of finished material. The bidders shall quote ex-works prices and freight including unloading and stacking at stores separately in the relevant schedule. Price shall be quoted on per MT basis in relevant schedule. Price shall be quoted on per MT which will form the basis of contract.

3.16 PRICES / PRICE VARIATION:

The price quoted for all the materials of the associated line accessories, civil works and other works for turn key completion of line should be **FIRM** except for tower parts (on account of variation in cost of steel, zinc & labour elements) and ACSR Conductor, till line work is completed and handed over to CSPTCL. The prices quoted in the Price Bid are to be unconditional which is to be noted carefully by the bidder. The conditional price bids shall not be evaluated by CSPTCL in any case. Bidders are requested to quote their prices in prescribed formats only. The prices for the fabricated tower parts & ACSR conductor shall be variable as per price variation formulae of IEEMA given in **Annexure-27 & annexure-28** respectively.

For all other materials prices should be offered on **FIRM** basis. The payment shall initially be done on the basis of base rate offered by bidder subject to price adjustment to reflect changes in the cost. Price variation shall be applicable for ex-works component.

The price adjustment shall be invoked by either party subject to the following further conditions:-

- a) For calculation of Price adjustment, date on which materials are notified as being ready for inspection at the works of the manufacturer shall be taken as the date of delivery subject to condition that material should be delivered to site store within 21 days from the date of issue of dispatch instruction. But, in case contractor fails to deliver the material within 21 days from the date of issue of dispatch instructions to the Site Stores, the price variation shall be applicable as on date on which materials are notified as being ready for inspection or actual date of receipt of material at site, whichever is advantageous to CSPTCL. However in case of delay of project beyond the scheduled date of completion of project, no price increase shall be allowed beyond scheduled date of completion. CSPTCL shall however be entitled to any decrease in the price which may be caused due to lower price adjustment amount in case of delivery beyond scheduled completion period, therefore, in case of delivery of equipments / materials beyond the scheduled completion period the liability of CSPTCL shall be limited to the lower of the price adjustment amount which may work out either on scheduled completion date or actual date of delivery.
- b) If price adjustment works out to be positive the same is payable to the contractor by CSPTCL and if it works out to be negative, the same is to be recovered by CSPTCL from the contractor.
- c) **The contractor shall submit price adjustment invoices for supplies positively within 6 (six) months from date of supply of equipment / materials whether positive or negative. Price adjustment bills for supply of equipment / materials submitted after 6**

(six) month (from date of supply) shall not be entertained. However negative variation shall be recovered.

The invoices should be supported with calculation of price variation along with documentary evidence of different indices applicable for price adjustment. Payment of price adjustment invoices shall be made after due verification as follows:-

- (i) 90% of the price adjustment for respective materials shall be paid after verification of invoices & receipt of material.
 - (ii) Balance 10% amount shall be paid after successful commissioning and handing over of line.
- d) If the delay in supply is occasioned due to force majeure conditions, for which extension in time is agreed to by the purchaser as per terms of the contracts, then payment of PV may be considered on the basis of merit of the case for the extended delivery period. However, permitting claim for price variation on extended delivery period is the sole discretion of the purchaser and intimation in this regard shall be given by the purchaser separately.
- e) The prices of standard and reputed manufacturer's items as per tender clause 4.26.15 (Vendor List) shall be quoted so that quality Assurance and performance of materials & equipments are guaranteed in future.

3.17 TAXES :-

The bidder shall quote his GST Registration number in Annexure A-10.

(i) GST and other levies in respect of supplies and services under the Contract, should be indicated separately in respective columns in the Price Bid Proposal Sheets. The ITC (Input tax credit) available to bidder should be duly considered while quoting the rate. **Any variation in tax rate during scheduled completion period will be on CSPTCL's account.**

(ii) **Cess under "Building and other Construction Workers Welfare cess Act, 1996:-** The contractor for carrying out any construction work in Chhattisgarh State must get themselves registered under section 7 (1) of the "Building and Other Construction Workers Welfare Cess Act, 1996" and rules made thereunder by the Chhattisgarh Govt. and submit Certificate of Registration issued by the Registering Officer of the Chhattisgarh Government (Labour Department) for enforcement of the Act. The cess @ 1% on cost of supply of materials and construction charges shall be borne by the contractor and same shall be deducted from each bill. **Any variation in this respect within scheduled completion period shall be to the account of CSPTCL.**

If the rate of applicable cess beyond contractual completion period undergoes upward revision, the payment will continue to be made only on the basis of rates prevailing during completion period. In case the rate of cess undergoes downward revision then the delayed works beyond contractual completion period will attract reduced rate of cess.

(iii) **Payment of other taxes/charges which are not described above:-**The bidder should be aware of the various taxes, duties, levies imposed by the Central Government, State Government or Local Bodies applicable in this contract as on the date of TC bid opening. Further, in the price bid, it should be specifically stated regarding each tax whether it is inclusive or exclusive. However, if there is no specific mention of any duties/levies as exclusive in the price bid, it will be presumed to be inclusive if it is applicable as on the date of TC bid opening and will not be paid extra.

(iv) Any variation in statutory taxes, including due to amalgamation or restructuring of existing taxes whether upward or downward within stipulated completion period shall be in the account of CSPTCL.

Tax Beyond contractual completion period:- If the rate of applicable taxes / duties beyond contractual completion period undergoes upward revision, the payment will continue to be made only on the basis of rates prevailing during scheduled completion period. In case the rate of statutory levies/ taxes undergoes downward revision then the delayed supplies/ work performed beyond contractual completion period will attract reduced rate of taxes/duties.

(v) Any other new tax: - But if any new tax/ duty/ levy is imposed either by central Government or by Stat Govt. / local authorities after the date of opening of T.C. Bid, the same shall be payable by CSPTCL extra within stipulated completion period on production of documentary evidence. However, tax due to increase of Turnover or withdrawal of tax exemption earlier available to the vendor etc. will not be reimbursed.

vi) The contractor shall be solely responsible for payment of all taxes, duties, license fee etc. if any, for all materials covered under this contract to the concerned authority as may be applicable from time to time.

3.18 EXTENSION OF TIME:

If the completion of line is delayed due to reason beyond the control of the contractor the contractor shall without delay give notice to the CSPTCL in writing of his claim for an extension of time. The CSPTCL on receipt of such notice may agree to extend the contract date of the Line as may be reasonable but without prejudice to other terms and conditions of the contract.

3.19 AGREEMENT:

The successful contractor shall have to enter into an agreement with the Engineer in the approved contract agreement form within 15 days of the receipt of the individual work orders failing which the contract may be cancelled.

3.20 SECURITY DEPOSIT:-

- (a) The contractor shall furnish a bank guarantee from a nationalized / scheduled bank for an amount of 10% (ten percent) of the cost of the contract including GST as a contract security. This bank guarantee shall be submitted within 15 days of receipt of individual orders and shall be kept valid for period exceeding the scheduled completion date by two months or two years from the date of signing of integrity pact whichever is later with additional claim period of six months.
- (b) In case, project is delayed (running beyond schedule) on any account the contractor will be required to extend the validity of BG well in advance at least for six months or period of expected delay plus six months claim period, whichever is more. Charges for extension of BG shall be borne by the contractor. The validity of the bank guarantee shall be extended on stamp paper worth Rs. 300/- or as per the prevailing legal requirements. The BG towards any other amount as per the C.G. State Stamp Duty Act shall be from a Nationalized/ Scheduled Bank in the prescribed form of CSPTCL. No interest shall be paid by CSPTCL on the security

deposit. In case of non-fulfillment of contractual obligations by the contractor, the security deposit shall be forfeited.

- (c) The security deposit will be released only after completion of entire works, issue of No dues/liability certificate from the Executive Engineer in charge of work and after submission of performance B.G.

3.21 GUARANTEE PERIOD:

The work done, material supplied by the contractor as per the contract specification should be guaranteed for satisfactory operation and against any defect in material and workmanship for a period of **24 (Twenty Four)** months from the date on which the Line has been put to service. The above guarantee certificate shall be furnished in triplicate to the CSPTCL for approval. Any defect noticed during this period should be rectified by the contractor free of cost to CSPTCL upon written notice. The date of delivery of line as used in this clause shall mean the date of taking over the Line by the Engineer. CSPTCL will arrange **220 KV** supply to Line within one month from the date of completion of Line. If Line is taken over un-energized condition due to non completion of feeding source then guarantee will be for **30 (Thirty)** months from the date of taking over or 24 (Twenty four) months from the date of energization of Line whichever is earlier.

3.22 PERFORMANCE GUARANTEE :-

- (a) After completion of work in all respect (final commissioning etc.) and before issue of final taking over certificate by the Engineer in charge of CSPTCL, the contractor shall provide CSPTCL a Performance Bank Guarantee from a Nationalized/Scheduled Bank for an amount of 5% (FIVE PERCENT) of the contract price in the approved B.G. Proforma of the CSPTCL. This Bank guarantee shall be executed on stamp paper worth Rs.300/- or any other amount as per the C.G. state stamp duty Act and shall be kept valid till completion of the guarantee period mentioned in the foregoing Clause plus six month claim period.
- (b) No interest shall be paid by CSPTCL for the aforesaid bank guarantee. In case of non-performance of the line as per the contract specification, the performance bank guarantee shall be forfeited.

3.23 PAYMENT DUE FROM THE CONTRACTOR:

All costs of damages for which the contractor is liable to the CSPTCL will be deducted by the CSPTCL from any money due to the contractor under the contract.

3.24 RESPONSIBILITY TO RECTIFY THE LOSS AND DAMAGE:

If any loss or damage happens to the work or any part thereof or materials/plant/equipments for incorporation therein during the period for which the contractor is responsible for the case thereof or from any cause for whatsoever, the contractor shall at his own cost rectify/replace such loss or damage, so that the permanent work conforms in every respect with the provision of the contract to the work/equipment occasioned by him in course of any operation carried out by him during performing the contract.

- 3.25 **EXTENSION ORDER:-** The extension order up to 50% of the total quantity/value may be placed on the same price, rates, terms & conditions.

3.26 **CONTRACT AGREEMENT SECURITY DEPOSIT AND INDEMNITY BOND:-**

A formal agreement, shall be entered into between the contractor and the purchaser for the due performance and observance of the terms and conditions of the contract

On acceptance of offer the successful tenderer will have to deposit as security an amount of 10% of the total value of order in the form of cash/DD or Bank Guarantee.

The successful tenderer will also submit the indemnity bond towards the safe custody of various line materials like conductors, OPGW, hard-wares and accessories etc. equivalent to the cost of materials which will be supplied by the CSPTCL to the contractor for erection of the line. The cost of materials shall include the cost of the towers and accessories to be supplied by the tenderers.

The proforma for contract agreement, Bank Guarantee for security deposit & Bank Guarantee towards performance are enclosed as **Annexure 23, 24 & 25 and proforma for Indemnity Bond is enclosed in annexure-26.**

3.27 **PROCEDURE OF SUPPLY OF TOWERS MATERIALS:**

- i. The payment will be made on certification by the Engineer that the respective consignment of tower parts has been duly received in the contractor stores and properly stacked. For this purpose the contractor shall provide office accommodation to our site staff In-charge of store accounting who will be available for verifying and certifying receipt of materials in the contractor's stores as and when the consignment is received.
- ii. The payment will be made only against supply of complete structure of various types of towers/extensions covered in this Specification.
- iii. After 20% (Twenty Percent) of the tower material is supplied by the contractor after due inspection, the contractor will furnish a detailed list of various structures which he wants to complete in lots so as to complete certain numbers of towers taking into consideration the material already dispatched plus proposed to be dispatched. The programme of delivery of completed towers in lots (i.e. batches) shall match with erection programme. The contractor shall fully establish to the satisfaction of the This Office that the tonnage proposed to be supplied would result in completed towers on taking into consideration the supplies made earlier. This Office will verify same and permit the contractor for taking up additional supplies.
- iv. The delivery of tower accessories should be made in such a way that the erection work of towers is not held up for want of these items. It will be the contractor responsibility to supply these items in line with the completion schedule of the transmission line.
- v. The weight of tower shall mean the weight of tower calculated by using black sectional (i.e. un-galvanized) weight of steel members of the size indicated in approved fabrication drawings.

3.28 **INSPECTION:**

(A) INSPECTION OF PROTO TYPES:-

- (i) Proto type of each type of structure/extensions shall be offered by the successful bidder for inspection within 2/3 months from the date of award of contract so that the tower parts are delivered timely and construction activities are not delayed for

want of tower material. Proto assembly of River crossing tower or Gantry Structure shall be offered for inspection if necessity arises due to site conditions to use these structures.

- (ii) Notwithstanding anything covered in the drawings and other details furnished by the purchaser, the Contractor shall make minor modifications, if any, in length, size, notching etc. according to the proto assembly, which are necessary for easy assembly of the structure. In any case the cost shall be payable on the basis of weight of structures as per approved Bill of materials of towers/extensions.
- (iii) The contractor have to supply 2 sets of workshop drawings along with 10 sets of structural drawings and Bill of materials modified according to proto corrections of each type of tower/extensions to the Purchaser.

(B) INSPECTION OF MATERIALS:-

- (i) Each consignment ready shall be offered to the purchaser for inspection before dispatch giving a minimum time of not less than fifteen days. Only complete sets of towers/extensions shall be offered for inspection. Samples of fabricated tower materials and accessories shall be subjected to tests as per relevant Indian Standard. The purchaser shall be kept informed about the source of procurement of raw-steel, particularly through re-rollers. The purchaser reserves right to inspect and get the samples of raw-steel tested as per Indian Standard-2062 and relevant standards. The cost of testing shall be borne by the bidder.
- (ii) The bidder shall abide by all the statutory provisions, acts such as the Indian Electricity Act, Indian Factory Act, Indian Boiler Act etc., and corresponding rules and regulations as may be applicable and as amended from time to time.
- (iii) The purchaser's representative shall be entitled at all reasonable time during manufacture to inspect, examine and test at the bidder's premises the materials and workmanship of the material to be supplied.
- (iv) The material shall not be dispatched unless waiver of inspection is obtained or inspected by the purchaser's authorized representative. When the material has passed the specified tests, the purchaser's representative shall furnish a certificate to this effect in writing to the bidder. In any case, while notifying the readiness of the material, the test certificate shall invariably be sent. The material shall not be dispatched unless the test certificates are approved.
- (v) Test certificates shall be in accordance with latest version of the relevant Indian Standards.
- (vi) The supplier shall keep the purchaser informed in advance of the time of starting and of the progress of manufacture and fabrication of structures at various stages.
- (vii) In case, any member of the structure is not found to comply with the relevant drawing, it shall be liable for rejection even after receipt.
- (viii) Defects, which may appear during fabrication, shall be made good. Any member once rejected shall be cut into pieces in front of the Purchaser's representative so that it is not offered again by mistake.
- (ix) If in case on schedule date of INSPECTION, the material is not ready for inspection the call shall be treated as fake call and recovery of Rs.5,000/- or actual expenses for visiting the premises of sub vendor per call whichever is more shall be made from the contractor's bill.

3.29 GENERAL GUIDELINES FOR INSPECTION :-

(A) Fabricated Structure Members:

- (i) Visual examination and quantity verification of offered lot.
- (ii) Sample selection from the offered lot at a ratio of 40 MT (or part thereof) 1 no. each for all tests.
- (iii) Dimension, fabrication and trueness verification of structure member from fabrication sketch.
- (iv) Galvanizing test of each sample i.e. dip test, hammer test and mass of zinc test.
- (v) Random verification of Zinc coating of galvanized surface by Alko-meter.
- (vi) Tensile test and bend test of each sample.
- (vii) Chemical composition test of at least two samples per offered lot of 50 MT for inspection.
- (viii) Verification of manufacturer's test certificate for mild steel used in structure members.

(B) Bolts-Nuts, Washer, Accessories, and Attachments etc.: (To be carried out at Manufacturers works of these items)

- (i) Visual examination and quantity verification of offered lot.
- (ii) Sample selection from the offered lot as per relevant Indian Standard for each item.
- (iii) Dimension, fabrication and trueness verification from fabrication sketch.
- (iv) Galvanizing test of each sample.
- (v) Other acceptance tests for respective items as per relevant Indian standard.

Since at the time of inspection only fabricated tower members and accessories will be verified, acceptance of any lot shall in no way relieve the bidder of his responsibility to meet all technical requirements of this specification for fabricated towers. In case any shortcoming is noticed at the time of actual assembly and erection, the purchaser may reject any part or item or accessory and the Bidder will have to assume the responsibility for free replacement/rectification of such defects.

(C) PACKING AND MARKING ON PACKING:

The material shall be boxed or bundled for transport in the following manner:

- (i) Angle shall be packed in bundles securely wrapped four times around at each end and over 900 mm with No.9 SWG steel wire with ends twisted tightly. Gross weight of any bundle shall not be less than 300 Kg and more than 2000 Kg. The bundle shall be in complete Tower form only.
- (ii) Cleat angles, brackets, filler plates and similar small loose pieces shall be nested and bolted together through holes and wrapped around at least four times with No.9 SWG wire with ends twisted tightly or packed in wooden crates. Gross weight of each bundle shall not exceed 200 Kg.
- (iii) Correct number of bolts, nuts and washers required for structures shall be packed in heavy gunny bags accurately tagged in accordance with the contents and a number of bags packed in a solid box of 22 mm thick lumber with panelled ends to be accurately nailed and further reinforced with 22 mm x 75 mm Batons round the sides and at the ends with 25 mm x No. 18 SWG iron band stretched entirely around the batons with ends overlapping at least 150 mm. Gross weight of each box shall not exceed 200 Kg.

- (iv) Packing list incorporating all relevant details e.g. quantity of structures (complete sets), number and size of steel sections, quantity of nuts, bolts, washers etc shall be forwarded along with each consignment.
- (v) In the nutshell the packing arrangement should be such that all packages of one particular type of structure are identifiable at site for the purpose of allocation for a particular work. In case more than one structure of a particular type is delivered in area store/work site, combined packing arrangement by way of clubbing members of similar type (for more than one structure) in a combined package should not be done. Uniform packing procedure for each structure should be adopted.
- (vi) All above packing are subject to the approval of the Purchaser or his appointed representatives.
- (vii) Each bundle or packing shall have the following marks:
- (viii) The name of the consignee (as per despatch instructions given by the CSPTCL).
- (ix) Ultimate destination as required by the CSPTCL.
- (x) The relevant marks and number of structure members or reference or bolts, nuts and small components like gusset plats, various attachment, etc. for easy identification.
- (xi) The marking shall be stencilled and indelibly inked on the top members in the bundles, on wooden boxes and also on gunny bas containing smaller components.

3.30 INSURANCE:

(A)

- i) The contractor will supply the tower to CSPTCL's / their site stores and therefore he will be responsible for the transit risks. It shall be contractor's responsibility to ensure proper packing and safe delivery of the material at the site stores. Any loss or damage caused to the materials during transit due to negligence on contractor's part shall be made good by the contractor free of all charges within one month from the date of consignee's notification, which will be issued within 30 (Thirty) days of receipt of materials at site. Transit insurance is not covered under the scope of this contract.
- ii) The Contractor shall arrange, secure and maintain insurance as may be necessary for all such amounts to protect his interests and the interests of the Purchaser, against all risks as detailed herein. The Contractor's failure in this regard shall not relieve him of any of his contractual responsibilities and obligations.
- iii) Any loss or damage to the materials during handling, transporting, storage and erection, till such time the material/line is taken over by the Purchaser shall be to the account of the Contractor. The Contractor shall be responsible for preferring of all claims and make good the damage or loss by way of repairs and/or replacement of the portion of the works damaged or lost. The transfer of title shall not in any way relieve the Contractor from the above responsibilities during the period of the contract. The Contractor shall provide the Purchaser with a copy of all insurance policies and Specifications taken out by him in pursuance of the contract. Such copies of Specifications shall be submitted to the Purchaser immediately after such insurance coverage is obtained. The Contractor shall also inform the purchaser in writing at least sixty (60) days in advance, regarding the expiry, cancellation and/or change in any of such Specifications and ensure revalidation/renewal etc. as may be necessary, well in time.

- iv) All costs on account of insurance liabilities covered under the contract will be on Contractor's account and will be deemed to be included in Contract price. The Contractor shall cover insurance with Indian Insurance Companies only.
- v) The contractor will indicate in questionnaire the cost element of such insurance cover, which he has assumed while quoting the rates. The above cost of material is inclusive of all materials like ACSR Conductor, OPGW, cost of stubs, GI Towers & tower extensions, tower accessories, Disc Insulators and Hardwares for Conductor & OPGW etc. to be supplied by the contractor. The contractor shall take up proper insurance to cover all the materials required for complete construction of the line to be supplied by the bidder against storage, handling, transportation and erection risks.
- vi) The contractor shall arrange above insurance for the total completion period of transmission line (period in months) as quoted by him in the completion schedule. For delay in the completion of the transmission line, up to 3 (three) months, due to any reason whatsoever, the contractor shall bear the charges of extension of insurance policy. For delay beyond 3 (three) months due to the reasons not attributable to the contractor, the CSPTCL shall reimburse the charges of extension of insurance policy to the contractor on presentation of evidence of having paid such amount to insurance company.
- vii) Any other insurance including the insurance of erection personnel employed by the Contractor/ his subcontractor shall also be the responsibility of the contractor and shall be arranged, if required, at his own cost.

(B)

- (i) The contractor shall insure the line and shall keep it insured against loss by theft, destruction or damage by fire, flood, undue exposure to the weather or through riot, civil commotion, war or rebellion, for the full value of the line from the time of delivery until the line is taken over as per relevant clause of this specification. This insurance shall also cover loss by theft on site.
- (ii) The bidder shall ensure following insurances also:-
 - i) Workmen Compensation Insurance:- This shall protect against claims applicable against workmen's Compensation Act 1948 (Govt. of India). This liability shall not be less than

Workmen's Compensation	As per Statutory Provisions
Employees Liability	As per Statutory Provisions
 - ii) Comprehensive Automobile Insurance :- This insurance shall be in such a form to protect the contractor against all claims for injuries, disability, disease and death of members of public including purchasers men and damage to property of others arising from use of motor vehicle during on or off the site operation irrespective of ownership of such vehicles.
 - iii) Comprehensive General liability insurance: It shall protect contractor against all claims arising from injury disability, disease or death of public or damage to property due to act of contractor or his representative.

3.31 SCOPE: COMMERCIAL TERMS AND CONDITIONS OF LINE ERECTION

These specifications provide for supply of towers and complete erection of the transmission line indicated in “Scope of specification.” The work includes of all line materials to be supplied by bidder such as conductors, ground wire, insulators, accessories etc., their complete erection, setting to work, testing and commissioning of the transmission line on turnkey basis.

3.32 PRICES AND QUANTITIES

Prices for various items of erection of transmission line are to be quoted in the manner specified in schedules appended with this specification. The prices will include the cost of labour, all tools and plants except otherwise specifically mentioned in this specification and other incidental charges in connection with the erection work, pertaining to each items as indicated in the schedules, unless otherwise indicated in the specification.

The quantities of line length, towers and extension indicated in the price schedule are only provisional and are for comparison purpose. The final quantities will be known after completion of survey and tower spotting. Thus these are only provisional quantities and will vary during actual execution of work. It may be noted that if during the execution of works, at any point of time, it is noticed that there is wide variation in quantity of material / quantum of work viz a viz provision in the contract, the contractor shall intimate the same to the OIC of the work. The OIC of the work in turn shall submit the proposal to the order placing authority for obtaining competent approval. The supply of material/execution of works (in excess of provision in the contract) shall only be carried out after the approval by the order placing authority. The contractor must execute the work based on actual soil conditions encountered and as per final quantities of towers indicated to him by the Engineer, at the same rates and terms and conditions accepted by the CSPTCL.

In the event of revision of quantity on completion of works, total value of supply of materials and erection charges shall be worked out with the unit rates of other bidders. In case the total value when calculated with unit rate of other bidder (viz L-2 or so on) is found lower than the revised value of order value, the total payment shall be limited to the lower of the two. This condition may be kept in view while quoting the rates.

3.33 COMPLIANCE WITH REGULATIONS

Unless otherwise specified, all works shall be carried out in accordance with the Indian Electricity Act, 1910; Indian Electricity Rules, 1956 with any amendments or revisions thereof which may be issued during the currency of the contract and the requirement of any other Regulations and Acts as applicable in India (including local statutory bodies) which the CSPTCL may be subjected to. Contractor shall also compliance with the Minimum Wages Act 1948 and the payment of Wages Act and the rules made their under in respect of any employee are workman employed are engaged by him or his sub contractor.

All railway tracks, power / communication line, or other important road crossings etc. or routing the line through air field region shall conform to the relevant rules and procedure laid down by railway, communication, aviation or other concerned authorities.

Suitable arrangements for aviation signal shall be provided at the top of the towers in the vicinity of civil / military aerodromes of air field regions, if any. Similar arrangements will also be provided on the special river crossing towers, if used.

3.34 “A” CLASS ELECTRICAL CONTRACTOR LICENSE:-

Contractor will have to submit a certified copy of “A” Class electrical contractor’s license issued by C.G. AnugyapanMandal, Raipur at the time of placement of order. The annual validation of the license shall be obtained by the contractor at his own cost and submitted to the purchaser during the currency of the contract.

3.35 RESPONSIBILITY FOR OBTAINING INFORMATION AND TAKING ACTION IN TIME.

Whenever any information or clarification in respect of construction of line have to be obtained from various authorities, the contractor shall be responsible for taking action well in time so that there are no delays on this account. The completion period offered in the tender shall be deemed to include the time taken for such incidental works. Request for extension of the completion date on such ground will not be entertained.

3.36 PERMITS AND PRIORITIES: Necessary permits, if any, required for the execution of the contract shall be arranged by the contractor himself. The contractor shall obtain the necessary license / permission as per central /state / local statutory bodies at his cost. The CSPTCL may, however, furnish to the contractor such certificates as may be required for the necessary permits / priorities for the execution of the work, if CSPTCL considers demand justified. The CSPTCL will, however, not be responsible for the delay in execution of the contract, if permits / priorities are not granted in time.

3.37 WAY LEAVE:

The bidders is requested to go through the following provisions of payment of way leave and the accepted prices quoted by them shall be deemed to include following expenses and no extra payment on this account shall be made by CSPTCL.

(a) **Payment of compensation of land :-**

In compliance to the CG Govt.’s orders No.F7-7/Seven-1/2014 dtd. 20.02.2015 and dtd. 07.05.2015 &No.F 7-7/Seven-1/2014 dtd. 01.06.2016 regarding payment of compensation towards utilization of the private land for erection of tower and laying of transmission line, the preparation of cases for payment of land compensation to the owner of land shall be prepared by the Contractor and the approval of the same shall be arranged by CSPTCL. The payment for above compensation shall also be borne & made by the CSPTCL as per the provisions contained in these orders.

(b) **Payment of compensation towards damage of crops :-**

The necessary proposal for payment of compensation towards damage of crops during execution of work, shall be prepared by the contractor. The payment of above compensation shall be borne & made by contractor.

(c) **Forest proposal :-** In case the line is passing through the forest, the forest proposal shall be prepared by the contractor in all respect and its approval shall be arranged by

CSPTCL. All statutory charges for obtaining forest approval like registration fee, tree cutting charges, afforestation charges etc. shall be borne by CSPTCL.

(d) **Tree cutting in Revenue/ Govt./ Private Land:-**

The preparation of proposal for tree cutting and approval thereof in Revenue/ Govt./Private land shall be arranged by the contractor. All Statutory charges & compensation for tree cutting on revenue / govt./ private land will be made by CSPTCL.

However, the tree cutting including related works in Revenue/Govt./ Private land shall be arranged by the Contractor at his own cost.

(e) **Railway crossing :-**

The Railway track crossing cases with drawing, questionnaire etc. will be prepared by the contractor and will be submitted to the Engineer I/C and CSPTCL will arrange the approval. All statutory payment like supervision charges, approval fee etc. will be paid by the CSPTCL directly to the Railway Department. The Railway Block charges if any will be paid by the CSPTCL for maximum of one hour per circuit per crossing. The Railway block charges beyond one hour per circuit per crossing will be borne by the contractor.

(f) **Statutory Payments :-**

In addition to above, statutory payment to all government agencies shall be borne by the CSPTCL. Any payment which becomes due on account of introduction of new policy of Govt. of India / Govt. of CG announced after issue of N.I.T., shall be paid by CSPTCL.

(g) **Payment of damages for access of site :-**

Any payments / charges required for access of site and damage of crops on way to the site shall be to the contractor's account.

(h) **Submission of proposals of way leave etc. :-**

It shall be responsibility of the contractor to submit the required proposal of way leave (viz. land compensation, railway crossing, tree cutting in revenue/private land, crops compensation etc.) in reasonable period, so that work is not hampered due to non availability of these way leaves.

3.38 USE OF PRIVATE ROAD/ APPROACH ROAD TO SITE:

The CSPTCL will help in getting necessary permission for use of private/ forest/ canals for transport of materials and construction personnel, wherever possible under the rules. Any charge levied by the concerned authorities for use of such roads etc. shall be borne by the contractor.

During the erection work, if approach roads are required to be constructed for reaching the construction sites for transportation of men/materials, the cost of construction of such approach roads and any other expenses incurred in obtaining clearance/ permission shall be borne by the contractor.

3.39 (i) MATERIALS TO BE ARRANGE BY THE CONTRACTOR AND PERMITTED EXTRA CONSUMPTION:

- (a) The quantity of conductor and OPGW to be incorporated in the line shall be worked as per the following norms:

Quantity of Conductor : Line length as per detailed survey
x 3 phases x No. of Circuits.

Quantity of OPGW: Line length as per detailed survey x 1

- (b) The contractor shall make every effort to minimize breakage, losses and wastage of the line materials during erection. However, the Contractor shall be permitted an extra consumption on following line materials only upto the limits specified here in :-

S.No.	Item	% of permitted extra consumption
1	Conductor	1
2	OPGW	1

All the materials required for completion of line shall be arranged by the contractor as per latest ISS as per actual.

- i. In case of conductor and OPGW, the permitted extra consumption limit of one percent is inclusive of sag, jumpering, damage, loss and wastage etc.
 - ii. However, for hilly terrain, where there is level difference between two locations, consumption shall be allowed equal to the increase in conductor length due to slope effect. Contractor shall prepared detailed consumption statement for such locations for the approval of Engineer-in-charge.
 - iii. The contractor shall not be required to return to the Owner empty conductor and OPGW drums and shall dispose-off the same at his cost.
 - iv. Any conductor and OPGW drum which has been opened by the Contractor shall not be taken back by Owner and the unused conductor or OPGW in such drums may be treated as waste permissible within the overall limits.
 - v. The quantities of line materials to be supplied by the Contractor (i.e. towers and accessories, conductor, OPGW, insulator, hardware fittings & accessories) as indicated in the bill of quantities are tentative and the actual quantity shall depend upon detailed survey. Contractor shall be responsible for regulating the supplies of Contractor supplied materials on the basis of actual requirements. The Owner shall have right not to take any surplus Contractor's supplied line materials.
- (ii) **EMPTY CONDUCTOR/ OPGW WOODEN DRUM ETC:** Empty conductor/OPGW, wooden drums and empty wooden crates/cases and bags of insulator hardware / accessories are non-returnable. However steel drum of conductor / OPGW may be returnable and the cost of Drum should not be included in cost of conductor/OPGW.

3.40 MATERIALS TO BE ARRANGE BY THE CONTRACTOR FOR ERECTION WORK:

The supply of cement for foundation work would be made by the contractor of quality as per I.S. 269 (latest revision). The cost of cement, metal & sand shall be deemed to be included in the quoted unit rates of casting of foundations of different

types of towers in different types of soils. The cement used shall be procured from reputed manufacturer.

Metal, sand and stones required for foundation/ revetment work shall be arranged by the contractor. The transport, octroi, levy or duty on these materials shall be borne by the contractor himself and the CSPTCL will not accept any liability on this account.

The contractor will also arrange steel rods and binding wires for foundation reinforcement. The cost incurred will be borne by him. Materials for grounding of towers i.e. galvanized earthing rod, connecting clamps and connecting wires etc. would also be arranged by the contractor as already specified.

Water supply and Electricity for construction work is to be arranged by the contractor at his own cost. Also, storage space for equipments and contractor's site office will be arranged by contractor.

3.41 TOOLS AND PLANTS TO BE ARRANGED BY THE CONTRACTOR:

The contractor shall be required to provide at his own expenses all necessary erection tools and plants for carrying out complete erection of the line i.e. survey, soil investigation, excavation, measurement of earth resistance, stub setting under tension and testing of the line. The contractor will have to arrange at his cost all tools and equipments such as surveying instrument, earth tester, soil investigation equipment, excavation equipment, form boxed for stub setting, winches, ropes and all tools for stringing conductor etc. The contractor will furnish in the relevant schedule, the list of all tools and plants as indicated above, which are available with him. Similarly, contractor will arrange at his cost all machinery and light and heavy vehicles such as jeeps, tractor, compressors for rock drilling, cranes for conductor drum handling, truck etc.

3.42 STUB SETTING TEMPLATES:

- a) Stub setting templates (un-galvanized) shall be arranged by the Contractor at his own cost for all heights of towers. Stub templates shall be of adjustable type and painted.
- b) The Contractor shall deploy sufficient number of templates for timely completion of the line without any extra cost to Owner.
- c) One set of each type of stub setting template shall be supplied to the Owner, on completion of the project at no extra cost to Owner.
- d) The following number of stub setting template shall be deployed by the contractor:-

(i) BN-2 type tower with extension	:	02 No.
(ii) BN-30 type tower with extension	:	02 Nos.
(iii) BN-60 type tower with extension	:	02 Nos.

If the CSPTCL feels that more templates are required for timely completion of the line, the contractor shall have to deploy the same without any extra cost to the CSPTCL.

3.43 SPECIAL CROSSING OF STRUCTURES / GANTRIES:

The bidders are required to quote prices for cost of foundation on per cubic meter (Cu.M) basis and cost of erection of super-structures of crossing structures on per MT basis. The crossing structures may be required for crossing of 765KV/400 KV/220KV/132KV transmission lines, major river, road & railway crossing. The drawings of crossing structures / gantries not mentioned in **clause4.02** will be supplied by the bidder without any extra cost to the CSPTCL. The design of long span river crossing is to be submitted in accordance with IS:802 1995 and **CBIP Manual Publication No.290**.

3.44 FORTNIGHTLY PROGRESS :-

The contractor will also have to submit a copy of the fortnightly progress reports along with each erection bill in support of the work done. Thus the progress reports will be prepared by the contractor strictly for the duration from 1st to 15th of the month and 16th to 30th/31st (last date) of the month throughout the construction period so that the quantum of work claimed in the bills matches with the completed activity of the works indicated in the progress report.

3.45 STORES FOR SUPPLY OF TOWERS (INCLUDING MATERIALS TO BE SUPPLIED BY THE CONTRACTOR):-

- 3.45.1 The Contractor shall be required to set up Store along the route of the transmission line.
- 3.45.2 The cement, reinforcement steel and other line materials (to be supplied by the contractor) shall also be arranged in above stores as per the sequence of the work.
- 3.45.3 The Contractor shall make arrangements to take delivery of all the materials and stock them properly.
- 3.45.4 Yards and stores for stocking provided by the Contractor shall be opened for inspection by the Purchaser's representative as and when desired.
- 3.45.5 The cost of handling and storage shall be deemed to be included in the quoted erection prices and no extra charges towards, loading, transportation, unloading, stacking and storage etc. shall be payable.
- 3.45.6 In case of materials to be supplied by the Contractor himself, all the above provisions shall also apply. However, shortage and/or damage of the materials shall be made good within a reasonable time and without any extra charge to the Purchaser and without delaying the construction of transmission line.
- 3.45.7 **CONSTRUCTION POWER AND WATER:-**Water supply and Electricity for construction work is to be arranged by the contractor at his own cost. Also, storage space for equipments and contractor's site office will be arranged by contractor.

3.46 PAYMENT PROCEDURE FOR ERECTION WORK:

Payment will be made against monthly erection bills for works completed during the month as certified by Engineer. Each category of the work shall be completed for purpose of payment. Part payment will not be made even if break up rates are available for particular category of work. Hence bill shall be preferred for completed portion of works as under: -

- a. Check survey (kilometre wise).
- b. The bill for foundation of tower shall be admitted only after completion of all activities related with foundation work i.e. excavation, stub setting,

earthing, reinforcement, concreting and backfilling with excavated / borrowed earth and consolidation of earth, carriage of surplus earth to the suitable point of disposal as required by the Purchaser or any other activity/related to completion of foundation work (location wise).

- c. Tower erection complete with tightening & punching of bolts including tack welding of bolts & nuts (location wise).
- d. Fixing of tower accessories i.e. providing danger, number, phase plates & anti-climbing device (location wise).
- e. Complete stringing (during the month) of conductors including providing of Accessories, jumpering etc. (kilometer wise).
- f. Complete stringing (during the month) of OPGW including providing of Accessories (including fixing of copper earth bond (kilometer wise).
- g. Miscellaneous works as and when completed during the month such as: -
 - a) Building of stone revetment with backfilling.
 - b) Counterpoise earthing etc (location wise).

3.47 IDLE / MOBILIZATION / DEMOBILIZATION CHARGES:- No idle / mobilization / demobilization charges will be payable by the CSPTCL for any reason whatsoever to the contractor for stoppage of work. This may please be noted.

3.48 CONTRACTOR SITE OFFICE ESTABLISHMENT:-

The contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of contract . Any written order or instruction of the CSPTCL or his authorized representative, shall be communicated to the said authorized representative of contractor and the same shall be deemed to have been communicated to the contractor at his legal address.

3.49 COMPLIANCE WITH LABOUR REGULATIONS

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all applicable existing labour enactments and rules made hereunder, regulation, notifications and byelaws of the State or Central Government or local authority and any other labour law (including rules), regulations, byelaws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The employees of the contractor and the Sub-contractor in no case shall be treated as the employee of the Owner at any point of time.

If the CSPTCL is caused to pay under any law as principal Owner such amount as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the Notifications/Byelaws/Acts/Rules/Regulations including amendments, if any, on the part of the Contractor, the CSPTCL shall have the right to deduct any money due to the contractor under this contract or any other contract with the CSPTCL including his amount or performance security for adjusting the aforesaid payment. The CSPTCL shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the CSPTCL .

3.50 PROTECTION OF WORK, PROTECTION OF PROPERTY AND CONTRACTOR LIABILITY:-

The contractor shall have total responsibility for protecting his works till it is finally taken over by the Engineer. No claim will be entertained by the CSPTCL or by the Engineer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the

specification and drawings, should any such damage to the Contractor's works occur because of any ways.

The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the Owner and the employees of other Contractors and Sub-Contractors and all public and private property including structures, building, other plants and equipment and utility either above or below the ground.

The Contractor will ensure provision of necessary safety equipment such as barriers, signboards, warning lights and alarms, etc. to provide adequate protections to person's and property. The Contractor shall be responsible to give reasonable notice to the Engineer are likely to get damaged or injured during the performance of his works and shall make all necessary arrangements with such Owner, related to removal and/or replacement or protection of such property and utilities.

-----End of Section-III-----

SECTION –IV (A)

TECHNICAL SPECIFICATIONS/CONDITION FOR SUPPLY OF TOWER, FOUNDATION AND FABRICATION FOR CONSTRUCTION OF LINE

4.0 GENERAL INFORMATION AND SCOPE:-This Specification covers the following scope of works:-

- (i) Fabrication and supply of G.I. 220KV transmission line towers, including Special crossing towers, Gantry column & beam (wherever applicable) including fasteners, step bolts, hangers, D-shackles etc.
- (ii) All types of tower accessories like phase plate, circuit plate (where ever applicable), number plate, danger plate, anti climbing device, Bird guard (where ever applicable).
- (iii) Detailed Design engineering for Foundation for different type of tower and casting of foundation for tower footings (wherever applicable).
- (iv) Supply of ACSR Zebra Conductor (54/3.18), OPGW, Disc insulators, Hardware Fittings and Conductor & OPGW Accessories.
- (v) Detailed survey including route alignment, profiling, tower spotting, optimization of tower locations, soil resistivity measurement & geotechnical investigation.
- (vi) Check survey; Foundation for different type of tower and casting of foundation for tower footings as per approved foundations Design & drawing.
- (vii) Erection of towers, tack welding of bolts and nuts including supply and application of zinc rich primer & two coats of enamel paint, tower earthing, fixing of insulator strings, stringing of conductors and earth wires along with all necessary line accessories.
- (viii) Testing and commissioning of the erected transmission lines and other items not specifically mentioned in this Specification and / or PBS but are required for the successful commissioning of the transmission line, unless specifically excluded in the Specification.

All measurements for payment shall be in S.I. units, lengths shall be measured in meters corrected to two decimal places. Areas shall be computed in square meters & volume in cubic meters. rounded off to two decimals.

This specification also includes the supply of ACSR Zebra Conductor, OPGW, Disc insulators, Hardware Fittings and Conductor & OPGW Accessories, as detailed in the specification. The technical description of these items are given in SECTION -IV -B.

All the raw materials such as steel, zinc for galvanizing, reinforcement steel, cement, coarse and fine aggregates for tower foundation, coke and salt for tower earthing etc. are included in the Contractor's scope of supply.

4.0.1 Stringing:-

The entire stringing work of conductor and OPGW of 220 KV line shall be carried out by tension stringing technique. The bidder shall indicate in their offer, the sets of tension stringing equipment he is having in his possession and the sets of stringing equipment he would deploy exclusively which under no circumstance shall be less than the number and capacity requirement indicated in Qualifying Requirements for Bidder. The bidder shall also indicate in the offer, the detail description of the procedure to be deployed for stringing operation for line. In hilly terrain and thick forest, where deployment of tension stringing machine is not possible, manual stringing may be adopted after getting approval of OWNER site Engineer. The contractor shall deploy appropriate tools / equipments / machinery to ensure that the stringing operation is carried out without causing damage to conductor / earth wire and conductor / earth wire is installed at the prescribed sag-tension as per the approved stringing charts.

SECTION –IV:A**TECHNICAL CONDITIONS FOR FOUNDATION & FABRICATION OF TOWER FOR CONSTRUCTION OF LINE.****4.1 Details of line Material:****4.1.1 Electrical System Data for 220 kV line**

S.No.	Particular	Unit	220 KV Line
1.	Nominal Voltage	kV	220

4.2.2 (A) Conductor for 220 KV line:

Sl. No.	Description	Conductor
1.	Type	ACSR “ZEBRA” Conductor
2.	Stranding and wire diameter	
	Aluminium	54/3.18
	Steel	7/3.18
3.	Conductor per phase	1
4.	Spacing between conductor of same phase(sub conductor spacing)(mm)	-
5.	Configuration	-
6.	Overall Diameter (mm)	28.62
7.	Unit mass (kg/km)	1621
8.	Min. UTS (kN)	130.32

C. Insulator String Hardware (As may be applicable)

a) Anchor Shackle
b) Chain Link
c) Ball Clevis
d) Arcing horn holding plate
e) Yoke plate
f) Socket clevis
g) Arcing horns
h) Corona control ring/grading ring.
i) Clevis Eye
j) Free center type/Armour grip suspension clamp for suspension strings.
k) Compression type dead end clamp for tension string.
l) Sag adjuster for tension string.
m) Balancing weight for pilot string
n) “U” clevis

D- Accessories for Conductor & Earth wire (As may be applicable)

a) Preformed Armour rods
b) Mid Span compression joint
c) Repair Sleeves
d) T-Connector
e) Flexible copper bonds

f)	Bundle Spacer
g)	Vibration dampers
h)	Rigid Spacer
i)	Suspension clamp for earth wire.
j)	Tension clamp for earth wire.

4.1.3	Service Condition Equipment/material to be supplied against this specification shall be suitable for satisfactory continuous operation under conditions as specified below:
	Maximum ambient temperature (Degree Celsius) : 50
	Minimum ambient temperature (Degree Celsius) : 4
	Relative humidity (% range) : 10-100
	Maximum annual rainfall & snowfall (Cm) : as per published Meteorological/ climatologically data

4.1.4 SCOPE:-

- a. The successful bidder will supply various types G.I. towers as indicated in price schedule, their extensions and accessories as envisaged for 220KV DCDS LINE. The scope covers supply of drawings of towers, extensions and stub setting templates and drawings of foundations in various types of soil, sag templates, sag tension chart for conductor and ground wire etc. as per drawings provided by CSPTCL.

4.2 TRANSMISSION TOWERS:-

4.2.1 General Description of the Tower

The transmission towers are of self-supporting hot dip galvanized lattice steel type. Designed to carry the line conductors, with necessary insulators, earth wires and all fittings under all loading conditions. The tower shall be fully galvanized using mild steel or/and high tensile steel sections as specified in relevant clause in section-IV. Bolts and nuts with spring washer are to be used for connections.

4.2.2 The towers shall be of the following types:

- 220 KV Double circuit (BN-2, BN-30, BN-60)
- Special towers.
- Gantry column and beam.

4.3 CLASSIFICATION OF TOWERS/ TYPE OF TOWERS:

The towers shall be double circuit, self supporting lattice type designed for the specified loading conditions with two peak(flat or horn).

4.3.1 The towers for 220 KV line are classified as given below.

Type of Tower	Deviation Limit	Typical Use
Small Angle Tower-“BN-2”	0 deg - 15 deg	i) Small angle tower to be used for line deviation from 0° degrees to 15° degrees with single / Double tension insulator strings. This tower is to be designed for section tower condition also ii) Also to be used for uplift force resulting from an uplift

Type of Tower	Deviation Limit	Typical Use
		span up to 200 m under broken wire condition. iii) Also to be used for Anti Cascading Condition. iv) To be used as Section Tower at 0 degree.
Medium Angle Tower- “BN-30”	15 deg-30 deg	i) Medium angle tower to be used for line deviation from 0° degrees to 30° degrees with single / Double tension insulator strings. This tower is to be designed for section tower condition also. ii) Also to be used for uplift forces resulting from uplift span up to 200 m under broken wire Condition. iii) Also to be used for anti cascading condition. iv) To be used as section tower at 0 degree deviation.
Large Angle & Dead end Tower- “BN-60”	30 deg-60 deg	i) Heavy angle tower to be used for line deviation of 0° degree to 60° degree and also as Dead End tower with single / double tension insulator strings ii) Also to be used for uplift forces resulting from an uplift span upto 300 m under broken wire condition. iii) for river crossing anchoring with longer wind span & 0 deg. Deviation on crossing span side and 0 deg. To 30 deg. Deviation on other side. iv) Dead end with 0 deg. To 15 deg. Deviation both on line side and sub-station side .

STRENGTH FACTOR FOR DESIGNING OF TOWER MEMBERS:

The Strength factor for designing of tower members shall be considered as per clause 17 of IS: 802 (Part-I/ Sec.-1): 2015

4.3.2 Special Towers/Gantry column & beam

The towers which will be specially designed for very long spans which cannot be crossed by normal tower with extensions like Major River crossings etc Shall be treated as special towers. If in any case over head line crossing technically not possible than same voltage level line may cross through single circuit DELTA tower or gantry .The design of Special Towers, single circuit DELTA tower and Gantry column & beam may also be made by contractor in his scope of work.

4.3.3 Extensions

4.3.3.1 The Double Circuit towers are designed so as to be suitable for adding 3M, 6M and 9M body extensions for maintaining adequate ground clearances without reducing the specified factor of safety in any manner for use with Tangent (BN-2), Angle, (BN-30) Angle, (BN-60) angle type tower .

4.3.3.2 The drawings of 18 and 25M body extension to tower types BN-2, BN-30 & BN-60 shall be supplied by owner. For Power Line Crossing or any other obstacle, tower types BN-2, BN-30 & BN-60 can be used with 18 and 25 M extensions depending, upon the merit of the prevailing site condition.

If extension more than 25M required for execution of the work the same will be designed by contractor.

4.3.3.3 The towers shall be designed for providing unequal leg extensions also, so that proper optimization of benching / revetment requirement can be done accordingly by the contractor. The towers are designed for unequal leg extensions of 3M, 6M and 9M generally with 3M maximum leg differential and in specific cases with 6m maximum leg differential. In exceptional situations where difference in leg differential does not suit the standard unequal leg extension provisions on the tower mentioned above, then suitable chimney extension shall be provided.

4.3.3.4 All above extension provisions to towers and foundations shall be treated as part of towers and foundations only.

4.4 Span and clearances

4.4.1 Normal Span

The normal ruling span of the line is 350M for 220KV lines.

4.4.2 Wind Span

The wind span is the sum of the two half spans adjacent to the support under consideration. For normal horizontal spans this equals to normal ruling span. Wind span for broken wire condition shall be taken 60% of that of Normal condition for all towers.

4.4.3 Weight span

The weight span is the horizontal distance between the lowest point of the conductors on the two spans adjacent to the tower. For spotting of structures, the span limits taken as per under.

Type of tower	Reliability condition		Security condition	
	Maximum	Minimum	Maximum	Minimum
BN-2	525	210	315	105
BN-30	525	0	315	(-)300
BN-60	525	0	315	(-)300

4.4.4 In case of certain locations where actual spotting spans exceed the design spans, cross-arms and certain members of towers are required to be modified / reinforced. In such cases, design & drawings of the modified/reinforced tower and its foundation shall be supplied by the Contractor as per site requirement without any extra cost to the Owner.

4.5 Electrical Clearances

4.5.1 Ground Clearance

The minimum ground clearance of **7.015 metres for 220KV line** shall be available corresponding to the maximum working temperature and normal span of **350 metres for 220kV line** or as per IS:5613. The clearance from building, trees, power line crossings should be made in accordance with the Indian Electricity Rules, 1956 as amended up-to-date and as per IS:5613.

All topographical details, permanent features, such as trees, building etc. **17.5 m for 220 KV line** on either side of the alignment shall be detailed on the profile plan. Conductor creep shall be compensated by over tensioning the conductor at a temperature of 26 deg C lower than the stringing temperature for ACSR Zebra **for 220KV line**.

4.6 STUB SETTING TEMPLATES:

The stub setting templates shall be required for each type of tower and its respective extensions and shall be supplied for each type of tower and its respective extensions. The template shall be of adjustable type i.e. for use with Standard towers as well as extensions. The stub setting templates shall be supply by contractor free of cost.

4.7 WIND LOAD:-

The wind load on conductors, earth wire, towers and insulator strings are as per the recommendations of I.S. 802 (Part-I) -1995 the following parameters are considered for designing:-

i.	Wing zones:	4
ii .	Basic wind speed:	47 Mtr. Per Second
iii.	Terrain category:	2
iv.	Reliability level:	1

- 4.8 TEMPERATURE VARIATION:** - The maximum working tension of conductor and OPGW under the uplift conditions shall correspond to the minimum temperature of 0° degree C.

The maximum conductor sag and ground clearance beneath should correspond to the maximum working temperature of 75 degrees C. the maximum ground wire temperature shall be taken as 53° degrees C.

- 4.9 BROKEN WIRE CONDITIONS:-** The towers are designed for:-

(a)	Tangent Tower Type BN-2	Any OPGW broken or one power conductor broken whichever is more stringent for a particular member.
(b)	Small Angle Tower Type BN-30	Any two of power conductors broken on same side and on the same span or any one of the power conductors and OPGW broken on the same side and same span which ever combination is more stringent for a particular member.
(c)	Medium Angle Tower Type BN-60	Any three power conductors broken on the same side and on the same span or any two of the power conductors broken and OPGW broken on the same side and same span whichever combination constitutes the most stringent condition for a particular member, besides Dead End type tower shall be designed for dead end condition i.e. all OPGW & power conductor broken on one side under normal working condition.

- 4.10 MINIMUM THICKNESS:** The minimum thickness of the tower member shall be as per clause 7 of IS: 802 (Part 1, Sec 2) 1992 with latest revision thereof.

- 4.11 MAXIMUM LENGTH:** - The maximum length of the members shall not exceed 7.0 meters.

- 4.12 PERMISSIBLE STRESSES:-** The permissible stresses in the tower member under tension and compression and in bolts and nuts shall be in accordance with the values given in IS : 802 (Part - I) - 1992 with latest revision thereof.

- 4.12.1 SLENDERNESS RATIOS:-**

The slenderness ratio for the various tower members shall be in accordance with procedure described in IS: 802 (Part - I/ Sec.-2) 1992 with latest revision thereof.

The allowable limit of stresses for tower members in compression for steel conforming to IS-2062-2006 shall be in accordance with the unit stress curves and unit stress level appended with IS : 802 (Part-I/ Sec.-2)-1992 with latest revision thereof.

- 4.12.2 THE EFFECTIVE AREA OF THE ANGLE SECTIONS IN TENSION:**

The net effective area of any tower member in tension shall be as described in IS : 802 (Part - I/ Sec.-2) (1992) with latest revision thereof.

- 4.12.3 BOLTING & STRESS ON BOLT:**

According to IS: 802 (Part - I/ Sec.-2) (1992) with latest revision thereof shall be considered. Not more than two different dia of bolts can be used in one tower if required.

- 4.12.4 FRAMING:**

The angle between any two members common to a joint of a trussed frame shall preferably be greater than 20 degree and never less than 15 degree due to uncertainty of struss distribution between two closely spaced members.

4.12.5 JOINTS :

The tower should be designed for bolted connections only. The bolts at the joints may be staggered such that the nuts may be tightened with spanners without fouling. The use of gusset- plates shall be kept to a minimum. Wherever possible, members shall be bolted together directly without excessive eccentricity. The thickness of the gusset plate shall be as per IS:802 (Part - I/ Sec.-2) (1992) clause 7 and not be less than 6 mm.

4.13 GALVANISING:-

Fully galvanized towers and stub shall be used for the lines. Galvanising of the member of the towers shall conform to IS:2629 and IS:4759. Post treatment (chromating) recommended as per IS:2629 shall also be carried out after galvanizing. All galvanized members shall withstand tests as per IS:2633. For fasteners the galvanising shall conform to IS:1367 (Part-13). The galvanising shall be done after all fabrication work is completed, except that the nuts may be taped or re-run after galvanising. Threads of bolts and nuts shall have a neat fit and shall be such that they can be turned with finger throughout the length of the threads of bolts and they shall be capable of developing full strength of the bolts. Spring washers shall be electro-galvanized as per Clause 4 of IS:1573.

4.14 MATERIAL OF TOWER STEEL SECTIONS:

The tower members including cross-arms shall be of structural steel quality conforming to I.S.2062: 2006 or latest revision thereof (section as per IEEMA circular). Only structural steel angles sections manufactured according to latest revisions of I.S 808 - The Dimension for hot rolled angle Section and Properties shall be taken into consideration in design of towers.

IS Steel Sections of tested quality of conformity with IS 2062 : 2006 Grade E 250 (Fe 410 W) (Designated Yield Strength. 250 MPa) and/or IS:2062-2006 grade E 350 (Fe 490)(Designated Yield Strength 350 MPa) are to be used in towers, extensions, stubs and stub setting templates. The Contractor can use other equivalent grade of structural steel angle sections and plates conforming to latest International Standards.

Steel plates below 6mm size exclusively used for packing plates/packing washers produced as per IS 1079 -1994 (Grade -0) are also acceptable. However, if below 6mm size plate are used as load bearing plates viz gusset plates , joint splices etc. the same shall conform to IS 2062 : 2006 or equivalent standard meeting mechanical strength/metallurgical properties corresponding to Fe-410 or above grade (designated yield strength not more than 355 MPa), depending upon the type of grade incorporated into design. Flats of equivalent grade meeting mechanical strength/ metallurgical properties may also be used in place of plates for packing plates/ packing washers. Medium and high strength structural steel with known properties confirming to the other national and international standard may also be used subject to the approval of the purchaser.

For designing of towers, preferably rationalized steel sections has been used. During execution of the project, if any particular section is not available, the same shall be substituted by higher section. Any cost on account of the same shall be borne by the Contractor. However, design approval for such substitution shall be obtained from the Owner before any substitution and records of such substitutions shall be maintained by the Contractor.

4.15 FASTENERS: BOLTS AND NUTS AND WASHERS:

The design of the towers and extensions are based on use of HRH mild steel hot dip galvanized bolts (5.6 quality) and nuts (5.0quality). The connections are designed on the basis of use of 16mm dia bolts preferably (if it is necessarily required than Not more than two different dia of bolts can be used in one tower.) The spring washers shall be provided for insertion under all nuts. These washers shall be of steel, electro galvanized, positive lock type and of 3.5mm thickness.

All bolts and nuts shall conform to IS:12427. All bolts and nuts shall be galvanized as per IS:1367 (Part 13)/IS:2629. All bolts and nuts have hexagonal heads and nuts, the heads being forged out of solid truly concentric, and square with the shank, which must be perfectly straight.

Bolts up to M16 and having length up to 10 times the diameter of the bolt should be manufactured by cold forging and thread rolling process to obtain good and reliable mechanical properties and effective

dimensional control. The shear strength of bolt for 5.6 grade should be 310 MPa minimum as per IS:12427. Bolts should be provided with washer face in accordance with IS:1363, Part-1 to ensure proper bearing.

Nuts should be double chamfered as per the requirement of IS:1363, Part-III. It should be ensured by the manufacturer that nuts should not be over tapped beyond 0.4mm oversize on effective diameter for size up to M16.

Fully threaded bolts shall not be used. The length of the bolt shall be such that the threaded portion shall not extend into the place of contact of the component parts.

All bolts shall be threaded to take the full depth of the nuts and threaded enough to permit the firm gripping of the component parts but no further. It shall be ensured that the threaded portion of the bolt protrudes not less than 3 mm and not more than 8mm when fully tightened. All nuts shall fit and tight to the point where shank of the bolt connects to the head.

Flat and tapered washers shall be provided wherever necessary. Spring washers shall be provided for insertion under all nuts. These washers shall be steel electro-galvanized.

To avoid bending stress in bolts or to reduce it to minimum, no bolt shall connect aggregate thickness of members more than three (3) times its diameter.

The bolts of 16mm size shall be manufactured by cold/hot forging process and the threads shall be rolled.

The bolts and nuts shall be free from forging and threading defects such as cuts, splits, burrs, bulging, taper, eccentricity, loose fit etc.

The bolts shall be threaded up to standard length only as per relevant Indian Standard and not to full length.

The bolts and nuts shall conform to IS 1967-1971 Part-III and Part-IV, IS 12427, IS 1363-92, IS 1367Part-XIII with latest amendment.

The spring washers designated as M 16-B suitable for 16mm dia galvanized bolt shall be manufactured out of rectangular section with tolerances as per IS 3063-1994 with latest amendments. The spring steel shall conform to IS- 4072-1975 with latest amendments "Specification for steel for spring washers".

The spring washers after coiling shall be suitably heat treated so as to result in the finished washer having hardness 43 to 50 HRC when tested in accordance with IS 1586- 1968.

The surface of the washers shall be free of scales and burrs. The washers shall be coiled without any kinks (except for the shape with turned-up ends). The ends of the washer shall not abut when the washers are compressed. The ends shall be so served as to prevent tangling.

The approximate weight of 1000 pieces of spring washers suitable for 16mm dia bolt shall be 8.91 kg. in natural black finish as shown in IS 3063-1972 with latest amendments.

The spring washer shall be electro galvanized with chromate passivation. The electro galvanizing of washers should conform to 'severe' grading service conditions incorporated in IS 1573-1986 as "Service Grade No.4", classification Fe Zn 25. The local thickness of zinc coating should be minimum 25 microns and average thickness 38 microns. It should be further suitably heat treated to avoid any danger of hydrogen embrittlement.

4.16 STEP - BOLTS:

Each tower will be provided on one of the legs, with step bolts conforming to IS:1363-1992, IS:10238 and IS:1367 (Part-XIII):1983 of not less than 16 m.m. diameter and 175 mm long, spaced not more than 450 m.m. apart and extending from 2.5 meter above the ground level to the top of the tower. For double circuit tower the step bolts shall be fixed on two diagonally opposite legs up to top of the towers. Each step bolt shall be provided with two nuts on one end to fasten the bolt securely to the tower and button head at the other end to prevent the feet from slipping away. The step bolts shall be capable of withstanding a vertical load not less than 1.5 KN

For special towers, where the height of the super structure exceeds 50 meters, ladders along with protection rings shall be provided with the design of tower by the contractor design shall be provided in continuation of the step bolts on one face of the tower from 30 meters above ground level to the top of the special structure. From 2.5m to 30m height of super structure step bolts shall be provided. Suitable platform using 6mm thick perforated chequered plates along with suitable railing for access from step bolts to the ladder and from the ladder to each cross-arm and the OPGW support shall also to be provided. The platform shall be fixed on tower by using counter-sunk bolts.

4.17 DANGER BOARD, NUMBER PLATE, CIRCUIT PLATE AND PHASE PLATES :-

Arrangement shall be provided for fixing of all tower accessories to the tower at a height between 2.5 mtr and 3.5 mtr above the ground level. Danger plates, Number plates, Circuit plates and phase plates shall be supply as per latest IS. and installed by the Contractor:

- a) Each tower shall be fitted with a danger plate, number plate, two sets circuit plate and phase plates for double circuit tower.
- b) The letters, figures and the conventional skull and bones of danger plates shall conform to IS:2551-1983 and shall be in a signal red on the front of the plate.
- c) The corners of the danger and number plate shall be rounded off to remove sharp edges.
- d) The letters of number plate shall be red enamelled with white enamelled background.
- e) Phase plate: This shall be in set of red, yellow and blue colour .
- f) Circuit plate: This may be combined with phase plate.

The drawings for danger board, number plate and phase plates are to be approved by CSPTCL before use. Necessary provision in tower design for fixing of these items shall be made.

4.18 ANTI-CLIMBING DEVICE WITH BARBED WIRE:-

Barbed wire type anti climbing device shall be installed by the Contractor for all type of towers. The barbed wire shall conform to IS:278/1978 with latest amendment and shall be type 'A-3'. The barbed wires shall be given chromating dip as per procedure laid down in IS:1340. Barbed wire type anti climbing devices will be used at a height of approximately 3 metres as an anti climbing measure which shall be arranged by the contractor. At every location three layers of barbed wire will be provided each inside and outside the tower in horizontal plane. Spacing between the layers with fixing arrangements shall be provided as per provisions of I.S. 5613 with latest revision thereof. The angle pieces with notches for accommodating barbed wire shall be supplied with the tower members. After the barbed wire is placed in position for the notches, the notch opening shall be welded to avoid the theft of barbed wire and anti corrosive treatment with cold galvanizing paint shall be given, as also in the case of the bolts to be welded below bottom cross arm level. Suitable locking arrangements (pad-lock) shall also be provided.

The Barbed wire shall be made of Hot dip Galvanized MS solid wire of size 2.5mm dia (for line wire) and 2.0 mm dia (for point wire). The barbs shall have four points and shall be formed by twisting 2 point wires, each two turns, tightly around both line wires making altogether four complete turns. The wire shall be galvanized by Hot dip process as per IS:2629/1966 (with latest amendment). The galvanized wire shall confirm to the requirement as per IS:4826/1971 with latest amendment in all respect IS:2633/1972 and IS 6745/1972 for testing of uniformity & mass of zinc coating. The zinc coating shall be medium type on line wire and light type on point wire i.e. having zinc coating minimum 110 gm/m² on line wire and 70 gm/m² on point wire.

4.19 PROVISION OF EARTHING:-

The provision shall be made in the stub for fixing Galvanized Earthing materials. The stub will be provided with a hole at a distance of 250 m.m. from bottom and at a distance of 500 m.m. below ground level for connection with Galvanized Earthing materials. The hole will be of 17.5 m.m. diameter.

The contractor shall also supply and fix properly the following materials for Galvanized Earthing towers .

Each tower shall be earthed. the tower footing resistance shall not exceed 10 ohms. The Contractor shall measure the tower footing resistance (TFR) of each tower during dry weather after it has been erected and before the stringing of the earth wire. Pipe type earthing and counter poise type earthing shall be done as required in accordance with the following standards:

IS: 3043 Code of practice for Earthing.

IS:5613 Code of practice for Design, Installation and maintenance (Part-II/Section-2) of overhead power lines.

The detailed drawing for pipe & counterpoise type earthing are given in drawing enclosed with this specification for reference. The contractor shall submit the detailed design for approval of Owner before installation of earthing.

For counterpoise type earthing the earthing will vary depending on soil resistivity. For soil resistivity less than 1500 ohms-meter, earthing shall be established by providing 4 lengths of 30m counterpoise wire.

The quoted price shall include fabrication, supply and installation of earthing material including supply of coke, salt etc. In case of counterpoise type earthing the quotation shall be based on 120 mtr of wire per tower.

4.20 Earthing for River Crossing Towers /Pile foundation

Galvanized earthing strip of flat 50 x 6 mm is to be provided in two legs of tower for each location with proper arrangement of connecting these strips by 16mm bolts shall be provided in the stubs. For pile foundation, the strip has to be taken up to scour level along the concrete of pile foundations. Only bolted connections are allowed for connecting this strip to achieve desired length. Contractor shall submit the detailed drawing for approval of Owner before installations

4.21 INSULATOR STRINGS ATTACHMENTS:-

- a) For the attachment of suspension Insulator string, a suitable dimensioned swinging hanger on the tower shall be provided so as to obtain specified clearances under respective swinging condition of the strings. The hanger, extensions links, D-Shackles etc. as required and considered in the design of the tower shall have similar as that of tensile strength of for single/ double suspension string. The design and supply of hanger, D-Shackles, strain plates etc. are also in the scope of Contractor.
- b) At tension towers strain plates of suitable dimensions under each cross-arm tip, shall be provided for taking the hooks or D-shackles of the tension insulator strings. To achieve requisite clearances, if the design calls for providing extra D-shackles, link plate etc. before connecting the insulator string the same shall be supplied by the Contractor

4.22 FABRICATION WORKMANSHIP:

Except where here-in-after modified, details of fabrication shall conform to I.S. 802 (Part - II) - or relevant International Standards.

The fabrication of towers shall be done strictly in accordance with the drawing approved by the CSPTCL.

The tower shall be of robust construction.

Normally lap splice shall be used for connecting the members of un-equal size and the inside angles of lap splice shall be rounded at the heel to fit the fillet of the outside angle. All splices shall develop full stress in the members connected through bolts. Butt-joints as well as lap joint splices shall be made as above and as close to the main panel as possible.

Joints shall be designed and detailed to avoid eccentricity as far as possible. The use of gusset plates for joining tower members shall be avoided as far as possible. However, where the connections are such that the elimination of the gusset plates would result in eccentric joints, gusset plates and spacer plates may be used in conformity with modern practice.

The tower structures shall be accurately fabricated to bolt together easily at site without any undue strain on the bolts.

No angle member shall have two leg flanges brought together by closing the angle.

The diameter of the hole shall be equal to the diameter of the bolt plus 1.5 mm.

The structure shall be designed so that all parts shall be accessible for inspection and cleaning. Drain holes shall be provided at all point where pockets of depressions are likely to hold water.

The identical parts shall be made strictly interchangeable. All steel section before any work is done on them shall be carefully levelled, straightened and made true to detailed drawings by methods which will not injure the materials so that when assembled the adjacent matching surface are in close contact throughout. No rough edges shall be permitted in the entire structures. Hammering is not permitted for straightening.

In the entire structures. Hammering is not permitted for straightening.

Cutting may be done by shearing, cropping, flame cutting or sawing. The surface so cut shall be cleaned smooth, reasonably square and free from deformation and distortion.

4.23 DRILLING AND PUNCHING:-

Before any cutting work is started, all steel sections shall be carefully straightened and trued by pressure and not by hammering. They shall again be trued after being punched and drilled.

The holes in the member shall either be drilled or punched with a jig, the former process will be preferred:-

Punching may be adopted for sections up to 12 mm thickness. For thicker sections drilling shall be done.

The holes shall be punched/drilled after bending and related position of these holes shall be maintained with the use of proper templates/jigs and fixtures .
The holes shall be perfectly circular and no tolerance in this respect is permissible. The holes shall be perpendicular to the plate and angle flanges.
Holes must be square with the plates or angles and have their walls parallel.

All burrs left by drills or punch shall be removed completely. When the tower members are in positions, the holes shall be truly opposite to each other. Drilling or ramming to enlarge defective holes shall not be permitted.

The minimum spacings of bolt and edge distance shall be as under :-

For 16 mm dia bolt edge distance of 20 mm from hole centre to rolled or swaged edge and 23mm from hole centre to sheared or flame cut edge, hole centre to hole centre distance minimum 40mm (the hole size being 17.5mm).

The gap between the edges of the connected members in butt joint shall not be more than 6mm and less than 4mm.

The bolt gauge distance in flanges of angle sections shall generally be in accordance with Table XXXI of SF6(1)-1961-ISI “ Hand Book for structural Engineers-Structural Steel Sections (Revised).”

4.24 TOLERANCES:-

The maximum allowable difference in the diameter of the hole on the two sides of the plate or angle shall not exceed 0.8 m.m. in diameter. The allowable taper in drilled / punched hole shall not exceed 0.8 m.m. on diameter.

The tolerance cumulative or between consecutive holes shall be within +/- 0.5 mm.

The tolerance on the overall length of member shall be within +/- 1.6 mm.

The tolerance on gauge distance shall be within +/- 0.5 mm.

4.25 MARKING:-

All members shall be distinctly given punch mark similar to the given in structural drawings. The mark shall be given with marking dies of minimum 18 mm size and this mark shall be legible. Letter BN-2, BN -30 and BN-60, which indicate the transmission line and the type of tower shall precede erection mark.

4.26 GALVANISING PASSIVATION AND PAINTING:

The tower parts, stubs and pack washers shall be hot dip galvanized. The galvanization shall be done as per requirements of IS 4759 or equivalent International Standard after all fabrication work is completed. The contractor shall also take guidelines from the recommended practices for hot dip galvanizing laid down in IS 2629 or equivalent International Standard while deciding and implementing galvanizing procedure. The mandatory requirements however, are specified herein.

Unless otherwise specified the fabricated tower parts and stubs shall have a minimum overall zinc coating of 610gms per sq.m. of surface except for plates below 5mm which shall have Zinc

coating of 460 gms per sq.m of surface. The average zinc coating for sections 5mm & above shall be maintained as 87 microns and that for sections below 5mm shall be maintained as 65 microns.

The zinc coating shall be adherent, reasonably uniform, smooth, continuous and free from imperfections such as black/bare spots, ash rust strains, bulky white deposits/wet storage strains and blisters.

The surface preparation for fabricated tower parts and stubs for hot dip galvanizing shall be carried out as indicated herein below:

- (i) **Degreasing & Cleaning of Surface:** Degreasing and cleaning of surface, wherever required, shall be carried out in accordance with clause 4.1 of IS 2629-1985 or equivalent International Standard. After degreasing the article shall be thoroughly rinsed. However, if acidic degreasers are used rinsing is not required.
- (ii) **Pickling:** pickling shall be done using either hydrochloric or sulphuric acid as recommended at clause 4.3 of IS 2629-1985 or equivalent International Standard. The actual concentration of the acids and the time duration of immersion shall be determined by the Contractor depending on the nature of material to be pickled. Suitable inhibitors also shall be used with the acids to avoid over pickling. The acid concentration, inhibitors used, and maximum allowable iron content shall form part of plant standard to be formulated and submitted to Purchaser along with Quality Assurance Program.
- (iii) **Rinsing:** After pickling, the material shall be rinsed, preferably in running water to remove acid traces, iron particles or any other impurities from the surface. Two rinse tanks are preferable, with water cascading from the second tank to the first to ensure thorough cleaning. Wherever single tank is employed, the water shall be periodically changed to avoid acid contamination, and removal of other residue from the tank.
- (iv) **Fluxing:** The rinsed article shall be dipped in a solution of zinc ammonium chloride, The concentration and temperature of the flux solution shall be standardized by the contractor depending on the article to be galvanized and individual circumstances. These shall form part of plant standard to be formulated and submitted to Purchaser along with Quality Assurance Program. The specific gravity of the flux solution shall be periodically monitored and controlled by adding required quantity of flux crystals to compensate for drag-out losses. Free acid content of the flux solution also shall be periodically checked and when it is more than two (2) grams of free acid per litre of the solution, it shall be neutralized. Alternatively, Ph value should be monitored periodically and maintained between 5.0 to 5.5.
- (v) **Drying:** When dry galvanizing is adopted the article shall be thoroughly dried after fluxing. For the purpose of drying, the contractor may use hot plate, air oven or any other proven method ensuring complete drying of the article after fluxing and prior to dipping in the molten zinc bath. The drying process shall be such that the article shall not attain a temperature at which the flux shall get decomposed. The article thus dried shall be galvanized before the flux coating picks up moisture from the atmosphere or the flux layer gets damaged or removed from the surface. The drying procedure, time duration, temperature limits, time lag between fluxing, drying, galvanizing etc shall form part of plant standard to be formulated and submitted to Purchaser along with Quality Assurance Program.
- (vi) **Quality of Zinc:** Any one or combination of the grades of zinc specified in IS 209 or IS 13229 or equivalent International Standard shall be used for galvanizing. The contractor shall declare the grade(s) of zinc proposed to be used by them for galvanizing. The molten metal in the zinc bath shall contain minimum 98.5 % zinc by mass. It shall be periodically measured and recorded. Zinc aluminium alloy shall be added as per IS 2629 or equivalent International Standard.
- (vii) **Dipping Process:** The temperature of the galvanizing bath shall be continuously monitored and controlled. The working temperature of the galvanizing bath shall be maintained at 450+/- 10 degree C. The article should be immersed in the bath as rapidly as possible without compromising on safety aspects. The galvanizing bath temperature, immersion angle & time, time duration of immersion, rate of withdrawal etc. shall be monitored and controlled depending upon the size, shape, thickness and chemical composition of the article such that the mass of zinc coating and its uniformity meets

the specified requirements and the galvanized surface is free from imperfections and galvanizing defects.

- (viii) **Post Treatment:** The article shall be quenched in water. The quench water is to be changed / drained periodically to prevent corrosive salts from accumulating in it. If water quenching is not done then necessary cooling arrangements should be made. The galvanized articles shall be dipped in chromating solution containing sodium dichromate and sulphuric acid or chromic acid base additive at a predetermined concentration and kept at room temperature to retard while rust attack. The temperature of the chromate solution shall not exceed 65 degree C. The articles shall not be stacked immediately after quenching and dichromating. It shall be ensured that the articles are dry before any further handling operation.
- (ix) **Storing, Picking and Handling:** In order to prevent while rust formation sufficient care should be exercised while storing handling and transporting galvanized products. The articles shall be stored in an adequately ventilated area. The articles shall be stored with spacers in between them and kept at an inclination to facilitate easy drainage of any water collected on the articles. Similar care is to be taken while transporting and storing the articles at site.

The Contractor shall prepare a detailed galvanizing procedure including Flow Chart with control parameters and all plant standards as required above and submit to PURCHASER for approvals as part of Quality Assurance Plan.

4.27 Standards

The design, manufacturing, fabrication, galvanizing, testing, erection procedure and materials used for manufacture and erection of towers, design and construction of foundations shall conform to the following Indian Standards (IS)/International Standards which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification

The material and services covered under these specifications shall be performed as per requirements of the relevant standard code referred hereinafter against each set of equipment and services. Other internationally acceptable standards which ensure equal or higher performance than those specified shall also be accepted.

Sl. No.	Indian Standard	Title	International Standard
1.	IS:209-1992	Specification for Zinc	ISO/R/752 ASTM B6
2.	IS 278-1991	Galvanized Steel Barbed wire	ASTM A131
3.	IS 800-1991	Code of Practice for General Building Construction in Steel	CSA 6.1
4(a).	IS:802(Part 1) Sec 1-1995 Sec 2-1992	Code of Practice in Overhead Transmission Line Tower : Materials, loads and Permissible Stress Section- 1: Materials and loads Section-2 : Permissible stresses.	ASCE 52 IEC 826 BS 8100
4(b).	IS:802(Part 2)- 1990	Code of Practice for use of structural steel in Overhead Transmission Line : Fabrication, Galvanizing, inspection & Packing	ASCE 52
4(c).	IS:802(Part 3)- 1990	Code of Practice for use of structural steel in Overload Transmission Line: Tower testing	ASCE 52 IEC 652
5.	IS:808-1991	Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections.	
6.	IS:875-1992	Code of Practice for Design Loads (other than Earthquakes) for Buildings and Structures.	
7.	IS:1363-1990	Hexagon Nuts (size range M5 to M36)	
8.	IS:1367-1992	Technical Supply Conditions for Threaded Steel/ Fasteners	

Sl. No.	Indian Standard	Title	International Standard
9.	IS:1477-1990	Code of practice for Painting of Ferrous Metals in Buildings: Part-I: Pre-treatment Part-II: Painting.	
10.	IS:1573-1991	Electro-Plated Coatings of iron on iron and Steel	
11.	IS:1852-1993	Rolling and Cutting Tolerances of Hot Rolled Steel Products	
12.	IS-1893-1991	Criteria for Earthquake Resistant Design of Structures	IEEE 693
13.	IS:2016-1992	Plain Washers	ISO/R887 ANSI B18-22.1
14.	IS:2062-2006	Steel for general structural purposes	
15.	IS:2074-1992	Ready Mixed Paint. Air Drying, Oxide. Zinc Chrome, Priming Specification.	
16.	IS:2551-1990	Danger Notice Plates	
17.	IS:2629-1990	Recommended Practice for Hot Dip Galvanising of iron and steel.	
18.	IS:2633-1992	Method of Testing Uniformity of Coating of Zinc Coated Articles	ASTM A123 CSA G164
19.	IS:3043-1991	Code of Practice for Earthing	
20.	IS:3063-1994	Single coil Rectangular section Spring Washers for Bolts, Nuts Screws	DIN-127
21.	IS:3757-1992	High Strength Structural Bolts	
22.	IS:4759-1990	Specification for Hot zinc coatings on structural steel and other Allied products	
23.	IS:5369-1991	General Requirements for Plain Washers	
24.	IS:5613-1993	Code of Practice for Design installation and Maintenance of Overhead Power Lines Section-1: Design Part 2, Section-2: Installation and Maintenance	
25.	IS:6610-1991	Specification for Heavy Washers for Steel structures	
26.	IS:6623-1992	High Strength Structural Nuts	
27.	IS:6639-1990	Hexagon Bolts for Steel Structure.	ASTM A394 ASTM A90
28.	IS:6745-1990	Method for Determination of weight of Zinc coated iron and Steel Articles.	ASTM A90
29.	IS:8500-1992	Specification for Weldable Structural Steel (Medium & High Strength Qualities)	
30.	IS:10238-1989	Step Bolts for Steel Structures	
31.	IS:12427-1988	Bolts for Transmission Line Towers	
31.	IS:12427-1988	Indian Electricity Rules.	
31.	Publication No. 19(N)/700	Regulation for Electrical Crossing of Railway Tracks	

4.28 TECHNICAL SPECIFICATION FOR G.I. NUTS & BOLTS:-

This specification of G.I. Nuts & Bolts covers the Manufacture, testing at manufacturer's works, supply and delivery of G.I. Nuts & Bolts as referred above. The Technical specification contained in this section are for the guidance of the bidder Any deviation from purchaser specification will be considered on their related merits or performance, efficiency, durability and overall economy consistent with the purchaser's requirements hereinafter stipulated.

a. IS SPECIFICATION FOR G.I. NUTS & BOLTS:-

S.No	Particulars	Relevant IS No.
1	IS Specification of BIS for all GI Nut Bolts	IS:12427-1988
2	Minimum sharing strength of bolts (kg per mm sq.)	IS:12427-1988
3	Minimum ultimate tensile strength of Bolts	IS:1367
4	Value of Hardness test: (x) Rock well hardness test (xi) Brinell hardness test	IS:1367
5	Indian standard for bolts & nuts dimensions	IS:12427-1988 and any latest revision thereof for property class 5.6/5
6	Indian standard for threading dimension of bolts & nuts	IS:1367-1967 including IS-1367 (Part-XIII) 1983 & any latest revision thereof and IS:4218 (Part-V) 1978.
7	Indian Standard for hot dip galvanizing	IS:1367 Part-XIII, 1983
8	Indian Standard for test of bolts & nuts	IS:1367-1967 and any latest amendment thereof.
9	Designation of standard for raw material for bolts & nuts.	IS:2062 Gr.A with latest amendment

b. GUARANTEED TECHNICAL PARTICULARS FOR GI NUTS AND BOLTS.

S. No	Description	Dimensions (in mm) 16 mm bolts, Property class 5.6
1	Nominal diameter	16.00
1)	i) Maximum diameter of Unthreaded shank	16.7
	ii) Minimum diameter of unthreaded shank.	15.3
3.	Width Across flats Nom/Max./Min.	24.00/24.00/23.16
4.	Width Across corner	26.17
5.	Thickness of bolt head (Max. / Min.)	10.75/9.25

6.	Pitch	2.00
7.	Length of thread	23.00
8.	Zinc coating thickness	Minimum 54 microns.
9.	Mass of coating	Minimum 375g/m ²
10.	Minor diameter. A) Before plating Max/ Min. B) After plating Max.	13.508 /13.204
11.	Nut Thickness Max. / Min.	15.9 / 14.1
12.	Across flat width of nut Max./ Min.	24.00 / 23.16
13.	Across corner width of nut Min.	26.17

NOTE:- The bolts of above specification with different lengths of 35, 40, 45, 50, 55, 60, 65 mm with 50% thread.

c. IS SPECIFICATION OF G.I. STEP BOLTS

S.No.	Particulars	Relevant IS No.
1	IS Specification of BIS for GI Step Bolts	IS:10238(2001) and Nuts IS:1363, Pt.III(1992)
2	Minimum ultimate tensile strength of Bolts	IS:1367
3	Value of Hardness test: (i) Rock well hardness test (ii) Brinell hardness test	IS:1367
4	Proof load test	IS:1367-2001
5	Indian standard for bolts & nuts dimensions	IS:10238-1982 and any latest revision thereof
6	Indian standard for threading dimension of step bolts & nuts	IS:4218 (Part-V) - 1978 & any latest revision thereof
7	Indian Standard for hot dip galvanizing step bolts & nuts	IS:1367 Part-XIII, 1983 & IS:2629
8	Indian Standard for test of step bolts & nuts	IS:1367-1967 and any latest amendment thereof.
9	Designation of standard for raw material for step bolts & nuts.	IS:2062 Gr.A with latest amendment

NOTE:- (i) The bolts of above specification with different lengths of 35,40,45,50,55, 60, 65,70, 75, 80 * 85mm with 50% thread. HDG.I. Nuts & Bolts shall confirm to IS:12427-1988 & IS:1367 overall any latest inclusion in amendment thereof and IS:4218 Part-V-1978. The raw material

used for manufacturing of HD G.I. Nuts & Bolts shall confirm to standard fixed by Bureau of Indian Standards and in respect of GI Nuts & Bolts. The hot dip galvanizing and other parameters shall confirm to IS:1367 part-13, 1983 with latest amendments thereof. The process adopted for manufacturing of GI Nuts & Bolts shall be head line process.

- (ii) The Step Bolts size 16x175mm shall be confirming to IS-10238 (2001) and all technical requirements as stated in the relevant IS.
- (iii) The material offered shall be of the best quality and work-manship. The relevant parameters must satisfy the technical particulars laid down by Bureau of Indian Standard for Hot Dip Galvanized Nuts & Bolts.

d. GUARANTEED TECHNICAL PARTICULARS FOR GALVANIZED SPRING WASHER FOR TRANSMISSION LINE

S.No	Particulars	
1.	ISS number to which spring washer will conform.	IS:3063
2.	ISS to which electro galvanized washer will conform	IS:1573
3.	ISS for tests regarding dimensions and strength etc.	IS:3063
4.	ISS for test for electro galvanising of washer.	IS:1573
5.	ISS for raw material of washers.	IS:4072
6.	Ultimate tensile strength.	700 N/m ²
7.	Hardness of finished washers in HRC after heat treatment as per Rock well hardness test.	43 – 50 HRC
8.	The free height of washers:- i) After having compressed flat for compression of 52,200N for 16mm size. ii) After compression and removal of pressure and repeated 20 times in quick succession.	5.95 mm 5.95 mm
9.	Method of testing for electro galvanising.	As per IS:1573
10.	Thic KNess of zinc coating in microns.	38 average, 25 min
11.	Result of twist test.	Passes
12.	Dimension, indicating tolerance of single coil Rectangular section spring washers with flat ends: i) Inside diameter basic tolerance. ii) Maximum outside diameter. iii) Breadth of washers basic tolerance. iv) Thic KNess of washers basic tolerance. v) Weight of spring washers (kg/1000 Nos. pieces)	16.2 ± 0.8mm 27.4 mm 5 ± 0.2 mm 3.5 ± 0.2mm 8.91 kg. approx. as per IS:3063

NOTE: Spring washer should be suitable for use with 16 mm bolts and nuts conforming to IS:1363 and electro galvanising should be as per IS:1573 service condition “3” i.e. minimum thickness of 25 microns and average thickness of 38 microns.

4.29 CLASSIFICATION OF FOUNDATIONS:

The foundation shall depend upon the type of soil, sub-soil water level and the presence of surface water which have been classified as follows and as per CBIP Manual publication No.268.

S.No	Name of soil	Remarks
1	Normal dry Soil.	To be used for locations where normal dry, cohesive or non-cohesive soils are met.
2	Wet	To be used for locations:- (a) Where sub-soil water is met at 1.5 Meter or more below the ground level. (b) Which are in surface water for long periods with water penetration not exceeding one meter below the ground level e.g. the paddy fields..
3	Partially submerged	When water table is at a depth between 1.5m and 0.75m below ground level and when the soil is normal and cohesive.
4	Fully submerged	When water table is within 0.75m below ground and soil is normal and cohesive.
5	Black cotton	When soil is cohesive having inorganic clay exceeding 15% and characterised by high shrinkage and swelling property. Where top layer of black cotton soil exceeds 50% and extends upto full depth or is followed by good soil and where top layer is good soil upto 50% of the depth but the lower layer is a black cotton soil. For designing purpose the soil is to be considered as Submerged.
6	Partial Black Cotton	When the top layer of soil up to 1.5 mtr is Black Cotton and thereafter it is normal dry cohesive soil.
7	Soft rock/Fissured Rock	To be used at locations where decomposed or fissured rock, hard gravel, kankar, limestone, laterite or any other soil of similar nature is met. Under cut type foundation is to be used at these locations.
8	Submerged Fissured Rock	Where fissure rock is encountered with subsoil water within 0.75m or below 0.75 m from G.L. (Top layer may be either a good soil or black cotton soil)
9	Hard rock	In locations where chiselling, drilling and blasting is required for excavation, hard rock type foundations are to be used where hard rock encountered at 1.5 m or less below ground level.
10	Sandy Soil	Sandy soil with clay content upto 5%

The foundation design for 220 KV towers will be supplied only for above soils.

In addition to the above, depending of the site conditions, other types of foundations may be introduced suitably for following type of soils for which the design will be submitted by the contractor without any extra cost to the Board:-

- (i) Intermediate conditions under the above classifications to effect more economy, or
- (ii) For locations in hilly and special rocky areas.

(iii) For locations where special foundation (well type, pile type or any other type) are necessitated, the proposal for this shall be submitted by the contractor based on the detailed soil investigations and approval for the same shall be obtained from the Purchaser

4.30 LOADS ON FOUNDATIONS:

The foundations shall withstand the ultimate loads on the superstructure with strength factor 1.1 as specified in this specification, for the full footing reactions along the stub angle slopes obtained from the structural stress analysis.

The reactions on the footing shall be composed of the following types of loads for which they shall be required to be checked:-

Maximum tension or uplift

Maximum compression or down thrust,

Maximum horizontal shear or side thrust.

The additional weight of concrete in the footing below ground level over the earth weight and full weight of concrete above the ground level in the footing and embedded steel parts will also be taken into account adding to the down thrust.

4.31 STABILITY ANALYSIS :-

The following primary types of soil resistances shall be assumed to act in resisting the loads imposed on the footings in earth:

Resistance against uplift: - The uplift loads will be assumed to be resisted by weight of earth in an inverted frustum of a conical pyramid of earth on the footings pad whose sides make an angle equal to the angle of repose of the earth with the vertical in average soil. The weight of concrete embedded in earth and that above the ground will also be considered for resisting the uplift. In case where the frustum of earth pyramids of two adjoining legs super impose each other, the earth frustum will be assumed truncated by a vertical plane through the centre line of the tower base.

Resistance against down thrust: - The down thrust loads combined with the additional weight of concrete above earth will be resisted by bearing strength of the soil assumed to be acting on the total area of the bottom of the footings. Additional movement due to side thrust shall also be considered while calculating bearing capacity as per CBIP Manual (Publication No.268).

Resistance against side thrust :- The bidder shall describe in detail the methods followed by them to check the stability of foundations for horizontal shears or side thrusts along with the relevant references (CBIP Manual publication No.268) in support of their contentions.

In addition to the strength design, stability analysis of the foundation shall be done to check the possibility of failure by over turning, up-rooting, sliding and tilting of the foundation.

4.32 **PROPERTIES OF EARTH :-** The following properties of earth under various conditions would be assumed for foundations:-

S. No.	PARTICULARS	ANGLE OF EARTH FRUSTUM (DEGREES)	UNIT WT. OF SOIL (KG/CUM)	LIMIT BEARING CAPACITY (KG./SQ. M.)
1	Normal dry soil	30	1440	25,000
2	Wet soil due to presence of sub soil water/surface water	15	940	12500
3	Black cotton soil			
a)	In Dry Portion	0	1440	12,500
b)	In Wet Portion	0	940	12,500
4.	Sandy Soil			

a)	With Clay content 0.5%	10	1440	25,000
b)	With Clay content 5-10%	20	1440	25,000
5.	Fissured Rock/Soft Rock (With undercut)			
a)	In Dry Portion	20	1700	62,500
b)	In Wet Portion	10	940	62,500
6.	Normal Hard Dry Soil (Murrum) with Undercut	30	1600	40,000
7.	Hard Rock	30	1700	125000

Note:

- (i) Where clay content is more than 10% but less than 15%, the soil will be classified as Normal Dry Soil.
- (ii) Angle of Earth shall be taken with respect to vertical.

4.33 PROPERTIES OF CONCRETE:-

The cement concrete used for foundations shall be Nominal Mix Concrete of Grade M-20 having 1:1.5:3 nominal mix ratio with 20 mm coarse aggregate for chimney portion and 40mm aggregates for pyramid or slab portion. The quantity of cement to be used per cubic meter shall be as per CPWD specification (DSR). All the properties of concrete regarding its strength under compression, tension, shears, punching and bending etc. as well as workmanship, will conform to IS: 456.

a) The Portland Cement used in concrete shall conform to 33 grade (IS:269)

or 43 grade (IS:8112) or 53 grade (IS:12269).

- b) The Pozzolena used in concrete shall confirm to IS:1489. The curing time of pozzolena cement will be decided at the time of execution of the work under the contract based on the certificate form a reputed laboratory which will be obtained and submitted by the Contractor.

Concrete aggregates shall confirm to IS:383.

The water used for mixing concrete shall be fresh, clean and free from oil, acids & alkalise, organic materials or other deleterious substances. Potable water is generally preferred.

- 4.34 **Reinforcement:-** Reinforcement shall confirm to IS:432 from MS bars and hard drawn steel wires and to IS:1139 and IS:1786 for deform and cold twisted bars respectively. Thermo mechanically treated (TMT) bars (equivalent grade) in place of cold twisted bars are also acceptable. All reinforcement shall be clean and free from loose mill scales, dust, loose rust and coats of paint, oil or other coatings, which may destroy or reduce bond. Contractor shall supply, fabricate and place reinforcement to shapes and dimensions as indicated or as required to carry out the intent of drawings and Specifications.

4.35 R.C.C. FOUNDATIONS:-

The R.C.C. foundations shall be in accordance with IS: 456-2000 or any revision/modification thereof, employing the same properties of materials, permissible stresses and mode of design as specified therein, when adoption of R.C.C. foundation results in overall economy over ordinary cement concrete foundation, Such foundations will not be permitted in pyramid forms and instead suitable steps of square slabs, each not less than 150 mm thick shall be adopted. The thickness of the bottom slab in touch with the base earth shall not be less than 300 mm. Further, suitable length of the stub shall be embedded in and covered by the foundation slabs so that adequate bond strength may develop for transferring the full design loads through concrete to the foundation slabs.

- 4.36 **FOUNDATION DEPTH:** The total depth of foundations below the ground level shall not be less than 1.5 M. To maintain inter-changeability of stubs for the same type of tower, the depth of each type of foundations for

each type of tower shall be equal except for foundation in hard rock. However, the maximum depth of foundation for all type of tower, except special crossing structures, shall not be more than 3.5 metre below the ground level.

4.37 **CONTRACTOR'S LIABILITY:-**The contractor shall ensure that the specification of materials and workmanship of all towers actually supplied conform strictly to the towers which have successfully undergone the tests. In case, any deviation is detected the Contractor shall replace such defective towers free of cost to the CSPTCL. All expenditure incurred in erection to and fro transportation; any other expenditure or losses incurred by the CSPTCL on this account shall be fully borne by the Contractor. No extension in delivery time shall be allowed on this account.

4.38 **STANDARDS:** The manufacturing, fabrication, Galvanising, testing, erection procedure and materials used for manufacture and erection of towers and construction of foundations shall conform to the Indian Standards (IS) which shall mean latest revisions, with amendments / changes adopted and published Unless specifically stated otherwise in the specification.

The material and services covered under these specifications shall be performed as per requirements of the relevant IS standards against each set of equipment and services.

4.39 **FINAL DRAWING DETAILS:**

The CSPTCL shall signify his approval or otherwise of the drawings submitted by the Bidder within a reasonable time generally not exceeding 30 days from the date of receipt of such drawings. Within 30 days of the receipt by the Contractor of the notification by the Board of his approval of such drawings, ten sets along with reproducible tracing of the drawings as approved shall be submitted to the Board by the contractor.

4.40 **DEPARTURE FROM SPECIFICATIONS TECHNICAL CONDITIONS:** In case of deviation from any of the requirements of the specifications, the same may be brought out clearly in annexure-16, otherwise it will be presumed that all the technical conditions of our specifications are acceptable to the Bidder.

4.41 **QUANTUM OF WORK:**

The quantities indicated in price schedules are based on preliminary assessment and are provisional. Thus, the quantities of towers and extensions etc. assumed are only provisional as also the number of location in various types of soils, The quantities of various work indicated are also provisional and may vary depending on actual type of soil / conditions encountered in the field depending on survey and approved profile. The work is to be completed as per actual site conditions and on same prices as offered and on similar terms and conditions.

However for offering tender prices the following quantum of work has been considered:-

Type of tower	Total No. of towers / Gantry	3M Extn. only	6M Extn. only	9M Extn. only	18M Extn. only
BN-2	40	04	02	02	00
BN-30	25	04	00	00	00
BN-60	15	02	02	02	00
Gantry (3Columns +2 Beams)	02	00	00	00	00
Total	80Tower+02 Gantry	10	04	04	00

Type of Locations in Different soil:-

Particulars	%	BN-2	BN-30	BN-60	Gantry (03Column /Gantry)	Total No. of tower/Gantries
Normal dry Soil.	10	04	03	01	06	08+02 Gantry
Wet	30	12	07	05	00	24
Black cotton	25	10	06	04	00	20
Partially submerged	Nil	00	00	00	00	00
Fully submerged soil	Nil	00	00	00	00	00
Dry fissured/ Soft Rock	20	08	05	03	00	16
Submerged Fissured Rock	15	06	04	02	00	12
Hard Rock	Nil	00	00	00	00	00
Sandy Soil	Nil	00	00	00	00	00
Total						80Tower+02 Gantry

SECTION-IV-B
TECHNICAL SPECIFICATIONS

SECTION-IV-B-(i)

1. Technical Description of Zebra Conductor

1.1 Details of Conductor

1.1.1 The ACSR Conductor shall generally conform to IEC: 1089/ IS: 398 except where otherwise specified herein.

1.1.2 The salient parameters of the ACSR Conductor are indicated below.

SN	Particulars	ACSR ZEBRA Conductor
a)	Stranding and wire diameter	54/3.18 mm. Al+7/3.18 mm Steel
b)	Number of Strands	
	Steel core	1
	1st steel layer	6
	1st Aluminium layer	12
	2nd Aluminium layer	18
	3rd Aluminium layer	24
c)	Sectional area of Aluminium	428.9/55.61 sq.mm.
d)	Total sectional area	484.50 sq.mm.
e)	Overall diameter (mm)	28.62

1.1.3 Standard Technical Particulars

1.1.3.1 The Standard Technical Particulars (STP) of the ACSR conductor are enclosed at Annexure-B of this section. The values indicated in the STP are the minimum and/or maximum values required to be met by the Supplier.

1.2 Workmanship

1.2.1 All the Aluminium and steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die marks, scratches, abrasions, etc., after drawing and also after stranding.

1.2.2 The finished conductor shall be smooth, compact, uniform and free from all imperfections including kinks (protusion of wires), wire cross over, over riding, looseness (wire being dislocated by finger/hand pressure and/or unusual bangle noise on tapping), material inclusions, white rust, powder formation or black spot (on account of reaction with trapped rain water etc.), dirt, grit etc.

1.2.3 The steel strands shall be hot dip galvanized and shall have a minimum zinc coating as indicated in the STP. The zinc coating shall be smooth, continuous, of uniform thickness, free from imperfections and shall withstand number of dips in standard Preece test as indicated in STP. The steel wire rods shall be of such quality and purity that, when drawn to the size of the strands specified and coated with zinc, the finished strands and the individual wires shall be of uniform quality and have the same properties and characteristics as prescribed in IEC: 888.

- 1.2.4 The steel strands shall be preformed and post formed in order to prevent spreading of strands in the event of cutting of composite core wire. Care shall be taken to avoid, damages to galvanization during pre-forming and post-forming operation.

1.3 Joints in Wires

1.3.1 Aluminium Wires

- 1.3.1.1 During stranding, no aluminium wire welds shall be made for the purpose of achieving the required conductor length.

- 1.3.1.2 No joints shall be permitted in the individual wires in the outer most layer of the finished conductor. However joints are permitted in the inner layer of the conductor unavoidably broken during stranding provided such breaks are not associated with either inherently defective wire or with the use of short lengths of aluminium wires. Such joints shall not be more than four (4) per conductor length and shall not be closer than 15 meters from joint in the same wire or in any other aluminium wire of the completed conductor.

- 1.3.1.3 Joints shall be made by cold pressure butt welding and shall withstand a stress of not less than the breaking strength of individual strand guaranteed.

1.3.2 Steel Wires

There shall be no joint of any kind in the finished wire entering into the manufacture of the strand. There shall also be no strand joints or strand splices in any length of the completed stranded steel core of the conductor.

1.4 Tolerances

The manufacturing tolerances to the extent indicated in the STP shall be permitted in the diameter of individual aluminium and steel strands and lay-ratio of the conductor.

1.5 Materials

1.5.1 Aluminium

The aluminium strands shall be hard drawn from electrolytic aluminium rods having purity not less than 99.5% and a copper content not exceeding 0.04%. They shall have the same properties and characteristics as prescribed in IEC: 889.

1.5.2 Steel

- 1.5.3 The steel wire strands shall be drawn from high carbon steel wire rods produced by either the acid or the basic open-hearth process, the electric furnace process, or the basic oxygen process and shall conform to the chemical composition indicated in the STP.

The Steel wire strands shall have the same properties and characteristics as prescribed for regular strength steel wire in IEC: 888.

1.5.4 Zinc

The zinc used for galvanizing shall be electrolytic High Grade Zinc of 99.95% purity as per IS209. It shall conform to and satisfy all the requirements of IS:209.

1.6 Standard Length

- 1.6.1 The standard length of the conductor shall be as indicated in the STP. .

2.0 Tests and Standards

Tests on ACSR Conductor shall be conducted as per latest relevant standard & tender specification.

2.1 Packing

2.1.1 The conductor shall be supplied in non-returnable, strong, wooden drums provided with lagging of adequate strength, constructed to protect the conductor against all damage and displacement during transit, storage and subsequent handling and stringing operations in the field. The Supplier shall be responsible for any loss or damage during transportation handling and storage due to improper packing. The drums shall generally conform to IS:1778, except as otherwise specified hereinafter.

2.1.2 The drums shall be suitable for wheel mounting and for letting off the conductor under a minimum controlled tension of the order of 5 KN.

2.1.2 Marking

Each drum shall have the following information stenciled on it in indelible ink along with other essential data :

- (a) Contract/Award letter number.
- (b) Name and address of consignee.
- (c) Manufacturer's name and address.
- (d) Drum number
- (e) Size of conductor
- (f) Length of conductor in meters
- (g) Arrow marking for unwinding
- (h) Position of the conductor ends
- (i) Distance between outer-most Layer of conductor and the inner surface of lagging.
- (k) Barrel diameter at three locations & an arrow marking at the location of the measurement.
- (l) Number of turns in the outer most layer.
- (m) Gross weight of drum after putting lagging.
- (n) Tear weight of the drum without lagging.
- (o) Net weight of the conductor in the drum.

The above should be indicated in the packing list also.

2.2 Standards

2.2.1 The conductor shall conform to the following Indian/International Standards, which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification.

2.2.2 In the event of the supply of conductor conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent to those specified. In case of award, salient features of comparison between the standards proposed by the Supplier and those specified in this document will be provided by the Supplier to establish their equivalence.

Sl. No.	Indian Standard	Title	International Standard
1.	IS: 209-1992	Specification for zinc	BS:3436-1986
2.	IS: 398 Part-I - 1996	Specification for Aluminium Conductors for Overhead Transmission Purposes	IEC:1089-1991 BS:215-1970
3.	IS:398 Part-II - 1996	Aluminum Conductor Galvanized Steel Reinforced	BS:215-1970 IEC:1089-1991
4.	IS:398 Part-V - 1992	Aluminum Conductor Galvanized Steel- Reinforced For Extra High Voltage (400 KV) and above	IEC:1089-1991 BS:215-1970
5.	IS : 1778-1980	Reels and Drums for Bare Conductors	BS:1559-1949
6.	IS : 1521-1991	Method of Tensile Testing of Steel Wire	ISO 6892-1984
7.	IS : 2629-1990	Recommended Practice for Hot Dip Galvanising of Iron and Steel	
8.	IS : 2633-1992	Method of Testing Uniformity of Coating on Zinc Coated Articles	
9.	IS : 4826-1992	Galvanized Coating on Round Steel Wires	IEC : 888-1987 BS:443-1969
10.	IS : 6745-1990	Methods of Determination of Weight of Zinc Coating of Zinc Coated Iron and Steel Articles	BS:433-1969 ISO 1460 - 1973
11.	IS : 8263-1990	Method of Radio Interference Tests on High Voltage Insulators	IEC:437-1973 NEMA:107-1964 CISPR
12.		Zinc Coated steel wires for stranded Conductors	IEC : 888-1987
13.		Hard drawn Aluminum wire for overhead line conductors	IEC : 889-1987

2.2.3 STANDARD TECHNICAL PARTICULARS OF ACSR ZEBRA CONDUCTOR

The ACSR ZEBRA CONDUCTOR to be supplied should confirm to IS:398 part-II with all the amendments made till to-day. However, important parameters are given below for :-

Sl.	Description	Unit	Guaranteed Values for ACSR Zebra
1.0	Raw Materials		
1.1	Steel Wire / Rods		
1.1	Aluminium		
a)	Minimum purity of Aluminium	%	99.50
b)	Maximum copper content	%	0.04
1.2	Steel wires/ rods		
a)	Carbon	%	0.50 to 0.85
b)	Manganese	%	0.50 to 1.10
c)	Phosphorous	%	Not more than 0.035
d)	Sulphur	%	Not more than 0.045
e)	Silicon	%	0.10 to 0.35 (Max.)
1.3	Zinc		
a)	Minimum purity of Zinc	%.%	99.95
2.0	No. of strands Alu./Steel	No.	54/7
a)	Cross section area		

b)	i) Alu/Steel. Strands ii) Whole Alu./Steel iii) Whole conductor	Sq. mm	7.942/7.942 428.90/55.6 484.50/643.58	
c)	Over all diameter of conductor	mm	28.62	
d)	Laying of strand		Alu.	Steel
	i) Center	No.	NA	1
	ii) First layer	No.	NA	6
	iii) Second layer	No.	12	NA
	iv) Third layer	No.	18	NA
	v) Fourth layer	No.	24	NA
2.1	Aluminum strands after stranding		54/3.18 mm.	
	Diameter			
a)	Nominal	mm	3.18	
b)	Maximum	mm	3.21	
c)	Minimum	mm	3.15	
2.2	Minimum breaking load of strand			
a)	Before stranding	KN	1.29	
b)	After stranding	KN	1.23	
2.3	Maximum resistance of 1 m length of strand at 20 deg. C.	Ohm Sq. per Mtr.	0.03626	
3.0	Steel strand after stranding		7/3.18	
2.1	Diameter			
a)	Nominal	mm	3.18	
b)	Maximum	mm	3.24	
c)	Minimum	mm	3.12	
3.2	Minimum breaking load of strand			
a)	Before stranding	KN	10.43	
b)	After stranding	KN	9.91	
3.3	Galvanising			
a)	Minimum weight of zinc coating per sq.m.	gm	260	
b)	Minimum number of dips that the galvanized strand can withstand in the standard preece test	Nos.	3 dips of one minute	
c)	Min. No. of twists in guage length equal 100 times the dia. of wire which the strand can withstand in the torsion test (after stranding)	Nos	18	
4.	Stranded Conductor			
4.1	UTS of the conductor	kN	130.32	
4.2	Lay length of outer layer	mm	Max	Min

a)	Steel layer	mm	28	13
b)	First Aluminium layer	mm	17	10
c)	Second Aluminium layer	mm	16	10
d)	Third layer	mm	14	10
4.3	DC resistance of the conductor at 20°C when corrected at standard weight Ohm-km i) Whole conductor ii) Strand	Ohm /km	0.06868 3.626	
4.4	Standard length of the conductor	m	1500	
4.5	Tolerance on Standard length	%	(+/-) 5	
4.6	Direction of lay of outer layer		Right Hand	
4.7	Linear mass of the conductor			
	Aluminium	kg/km	1182	
	Steel	kg/km	439	
a)	Total Standard	kg/km	1620	
5.0	Coefficient of linear expansion of Conductor per degree celcius i) Aluminium ii) Steel	per degree celcius	19.3x10 ⁻⁶	
5.1	Calculated final Modulus of elasticity kg/ cm ²	kg/ cm ² GN/Sq. M	69	
5.2	Temp. Variation	0 Deg./75 Deg.C		
5.3	Current carrying capacity. at 40 deg. Cent. Ambient and 30 deg. Rise	Amp	740	
5.4	Elongation before stranding steel strand	%	4/3.5	

SECTION-IV-B(ii)**TECHNICAL SPECIFICATIONS FOR
OPGW AND ASSOCIATED HARDWARES****(1) INTRODUCTION and GENERAL INFORMATION:**

The Tender Document describes the technical specifications for Supply of OPGW & its associated hardware & fittings are being procured by the CSPTransCL as a part of the **Tender No. TR-20/13**.

This Specification describes the functional and performance requirements of the OPGW Cable and its associated hardware & fittings.

1.1 Scope

The scope of the this specification includes Design, engineering, manufacturing, testing, supply, loading, transportation, unloading, and erection of **(a) OPGW Cable (b) Associated hardware & fittings and In-line Splice enclosure** on 220 KV DCDSline from 400/220 KV Substation Kurud to proposed 220/132 KV substation Patan,Distt.-Durg:

1.2 General Requirements

This specification defines the design, performance and testing requirements for supply of OPGW cable & its associated hardware & fittings.

The Contractor is encouraged to offer standard products and designs. However, the Contractor must conform to the requirements and provide any special equipment necessary to meet the requirements stated herein.

The Bidder's proposal shall address all functional and performance requirements within this specification and shall include sufficient information and supporting documentation in order to determine compliance with this specification without further necessity for inquiries.

The Bidder's proposal shall clearly identify all features described in the specifications or in any supporting reference material that will not be implemented; otherwise, those features shall become binding as part of the final contract.

An analysis of the functional and performance requirements of this specification and/or design, and engineering may lead the Contractor to conclude that additional items (hardware/software) are required that are not specifically mentioned in this specification. The Contractor shall be responsible for providing at no added cost to the **CSPTransCL**, all such additional items. Such materials shall be considered to be within the scope of the contract. To the extent possible, the Bidders shall identify and include all such additional items (hardware/software) in their proposal.

OPGW cable & associated hardware & fittings shall be designed to operate in varying environments. Adequate measures shall be taken to provide protection against rodents, contaminants, pollutants, water & moisture, lightning & short circuit, vibration and electro-magnetic interference etc.

1.3 Contractor Responsibilities and Obligations

The Contractor shall be responsible for design, engineering, manufacturing, testing for acceptance, supply, loading, transportation, unloading, transit insurance, delivery at site for supply of OPGW cable & its associated hardware & fittings.

The Contractor's obligations include, but are not limited to, the following:

- 1) Provide OPGW cabling that meets the functional and performance requirements of this specification.
- 2) Engineering and design specific to each location including review of, and conformance with local environmental and earthing requirements.
- 3) Testing and documentation for OPGW cable & its associated hardware & fittings.
- 4) Design of the mechanical assemblies and accessories, including vibration dampers required for installation of all overhead fibre cable.
- 5) Factory acceptance testing of all equipment provided.
- 6) Conduct type tests and provide documented evidence of satisfactory Type Test performance to the Employer.
- 7) Detailed descriptions of the Contractor's obligations, in relation to individual items of hardware, software, functions and services, are delineated in other sections of this specification.

1.4 Applicable Standards

The following standards and codes shall be generally applicable to the equipment and works supplied under this Contract:

- (1) American Society for Testing and Materials ASTM-B415, ASTM-D1248, ASTM D 3349.
- (2) ITU-T/CCITT Recommendations G.650, G.652, G.653, G.655
- (3) Institute of Electrical and Electronics Engineers IEEE-812, 1138-1994, IEEE-524, IEEE-828 & 830.
- (4) Electronic Industries Association, EIA-455-3, 455-31B, 455-32, 455-91, 455-78, 455-59, 455-80, 455-169, 455-81, EIA RS 598
- (5) International Electrotechnical Commission standards, IEC -1396 and IEC - 1089.
- (6) International Electrotechnical Commission standards, IEC 793-1, 793-2, 794-1, 794-2, IEC-529, , IEC 60794-1-2 , IEC 60794-4-10

Specifications and codes shall be the latest version, inclusive of revisions, which are in force at the date of the contract award. Where new specifications, codes, and revisions are issued during the period of the contract, the Contractor shall attempt to comply with such, provided that no additional expenses are charged to the CSPTRANSCL .

In the event the Contractor offers to supply material and/or equipment in compliance to any standard other than Standards listed herein, the Contractor shall include with their proposal, full salient characteristics of the new standard for comparison.

1.5 References

- (1) CIGRE Guide for Planning of Power Utility Digital Communications Networks
- (2) CIGRE Optical Fibre Planning Guide for Power Utilities
- (3) CIGRE New Opportunities For Optical Fibre Technology in Electricity Utilities
- (4) CIGRE guide to fittings for Optical Cables on Transmission Lines.

(2) SPECIFICATIONS AND FUNCTIONAL DESCRIPTION OF FIBRE

OPTIC CABLE:

This section describes the functional & technical specifications for supply of OPGW cable & its associated hardware & fittings.

2.1 Fibre Optic Cabling

2.1.1 General

The Contractor shall supply 12 fibre (DWSM) OPGW fibre optic cable. The cable length requirement is indicated in the appendices.

All optical fibre cabling including fibre itself and all associated installation hardware shall have a minimum guaranteed design life span of 25 years.

Required Optical Fibre Characteristics

The characteristics of optical fibre to be provided under this specification are as follows.

Physical Characteristics

Dual-Window Single mode (DWSM), G.652 telecommunication grade optical fibres shall be provided in fibre optic cables. DWSM optical fibres shall meet the requirements defined in Table 2-1(a).

Attenuation

The attenuation coefficient for wavelengths between 1525 nm and 1575 nm shall not exceed the attenuation coefficient at 1550 nm by more than 0.05 dB/km. The attenuation coefficient between 1285 nm and 1330 nm, shall not exceed the attenuation coefficient at 1310 nm by more than 0.05 dB/km. The attenuation of the fibre shall be distributed uniformly throughout its length such that there are no point discontinuities in excess of 0.10 dB. The fibre attenuation characteristics specified in Table 2-1(a) shall be “guaranteed” fibre attenuation of any & every fibre reel.

Table 2-1(a)

DWSM Optical Fibre Characteristics

Fibre Description:	Dual-Window Single-Mode
Mode Field Diameter:	8.6 to 9.5 μm ($\pm 10\%$ of the nominal value)
Cladding Diameter:	125.0 $\mu\text{m} \pm 2 \mu\text{m}$
Mode field concentricity error	$\leq 1.0\mu\text{m}$ at 1310 nm
Cladding non-circularity	$\leq 2\%$
Cable Cut-off Wavelength λ_{cc}	≤ 1260 nm
1550 nm loss performance	As per G.652
Proof Test Level	≥ 100 kpsi
Attenuation Coefficient:	@ 1310 nm ≤ 0.35 dB/km @ 1550 nm ≤ 0.23 dB/km
Chromatic Dispersion; Maximum:	20 ps/(nm x km) 1550 nm 3.5 ps/(nm x km) 1288-1339nm 5.3 ps/(nm x km) 1271-1360nm
Zero Dispersion Wavelength:	

Table 2-1(a)
DWSM Optical Fibre Characteristics

Zero Dispersion Slope:	1300 to 1324nm -0.093 ps/(nm ² ×km) maximum
Polarization mode dispersion coefficient	≤□0.5 ps/km ^{1/2}
Temperature Dependence:	Induced attenuation ≤ 0.05 dB (-60°C - +85 °C)
Bend Performance:	@ 1310 nm (75±2 mm dia Mandrel), 100 turns; Attenuation Rise ≤ 0.05 dB/km @ 1550 nm (75±2 mm dia Mandrel), 100 turns; Attenuation Rise ≤ 0.10 dB/km @ 1550 nm (32±0.5 mm dia Mandrel), 1 turn; Attenuation Rise ≤ 0.50 dB/km

Fibre Optic Cable Construction

Overhead Fibre Optic Cables shall be OPGW (Optical Ground Wire). The design of cable shall account for the varying operating and environmental conditions that the cable shall experience while in service.

EHV Transmission Line- Earthwire/Conductor Details

Details of maximum spans, voltage levels and the relevant characteristics of the earthwire/conductor required for design of OPGW cable shall be considered same as given in **tender specification Section IV A & B.**

Optical Fibre Identification

Individual optical fibres within a fibre unit, and fibre units shall be identifiable in accordance with EIA/TIA 598 or IEC 60304 or Bellcore GR-20 colour-coding scheme.

Buffer Tube

Loose tube construction shall be implemented. The individually coated optical fibre(s) shall be surrounded by a buffer for protection from physical damage during fabrication, installation and operation of the cable. The fibre coating and buffer shall be strippable for splicing and termination. Buffer tubes shall be filled with a water-blocking gel.

Optical Fibre Strain

The fibre optic cable shall be designed such that the optical fibres experience no strain under all loading conditions defined in IS 802. No fibre strain condition shall apply even after a 25 year cable creep.

For the purpose of these specifications, the following definitions shall apply:

- Maximum Working Tension (MWT) is defined as the maximum cable tension at which there is *no fibre strain*.
- The no fibre strain condition is defined as fibre strain of less than or equal to 0.05%, as determined by direct measurements through IEC/ ETSI (FOTP) specified optical reflectometry techniques.
- The Cable strain margin is defined as the maximum cable strain at which there is no fibre strain.
- The cable Maximum Allowable Tension (MAT) is defined as the maximum tension experienced by the Cable under the worst case loading condition as defined in IS 802.
- The cable max strain is defined as the maximum strain experienced by the Cable under the worst case loading condition as defined in IS 802.
- The cable Every Day Tension (EDT) is defined as the maximum cable tension on any span under normal conditions viz at 32 °C and no wind.
- The Ultimate /Rated Tensile Strength (UTS/ RTS/ breaking strength) is defined as the maximum tensile load applied and held constant for one minute at which the specimen shall not break.

While preparing the Sag-tension charts for the OPGW cable the following conditions shall be met:

- The Max Allowable Tension (MAT) / max strain shall be less than or equal to the MWT/ Strain margin of the cable.
- The sag shall not exceed the earth wire sag in all conditions.
- The Max Allowable Tension shall also be less than or equal to 0.4 times the UTS of OPGW. However, Max Allowable Tension up to 0.5 times the UTS of OPGW may be accepted, subject to no fibre strain.
- The 25 year creep at 25% of UTS (creep test as per IEEE 1138) shall be such that the 25 year creep plus the cable strain at Max Allowable Tension (MAT) is less than or equal to the cable strain margin.
- The everyday tension (EDT) shall not exceed 20% of the UTS for the OPGW cable.

The Sag-tension chart indicating the maximum tension, cable strain and sag shall be calculated for the following conditions as specified in IS 802:1977/1995:

- a. 53 °C, no wind, no ice
- b. 32 °C, no wind, no ice
- c. 0 °C, no wind, no ice
- d. 32 °C, full wind, no ice
- e. 0 °C, 2/3rd / 36% of full wind (IS 802:1977/1995)

The above cases shall be considered for the spans from 100 m to max. span length in the range of 50 m spans. The full wind load shall be considered as the design wind load as per relevant IS 802 version and the sag-tension chart shall be submitted accordingly.

2.1.3.5 Cable Materials

The materials used for optical fibre cable construction, shall meet the following requirements:

Filling Materials

The interstices of the fibre optic unit and cable shall be filled with a suitable compound to prohibit any moisture ingress or any water longitudinal migration within the fibre optic unit or along the fibre optic cable. The water tightness of the cable shall meet or exceed the test performance criteria as per IEC-60794-1-F-5.

The filling compound used shall be a non-toxic homogenous waterproofing compound that is free of dirt and foreign matter, nonhygroscopic, electrically nonconductive and non-nutritive to fungus. The compound shall also be fully compatible with all cable components it may come in contact with and shall inhibit the generation of hydrogen within the cable.

The filling compound shall remain stable for ambient temp. between -20°C and +65°C and shall not drip, flow or leak with age or at high temperatures during short duration lightning strikes and short circuit currents. The filling compound shall meet the requirements of “Seepage of Filling Compound test” as per EIA/TIA 455-81.

The waterproofing filling materials shall not affect fibre coating, colour coding, or encapsulant commonly used in splice enclosures, shall be dermatologically safe, non-staining and easily removable with a non-toxic cleaning solvent.

Metallic Members

When the fibre optic cable design incorporates metallic elements in its construction, all metallic elements shall be electrically continuous.

Marking, Packaging and Shipping

This section describes the requirements for marking, packaging and shipping the overhead fibre optic cable.

- (a) **Drum Markings:** Each side of every reel of cable shall be permanently marked in a minimum of 1 cm high white lettering with the vendors' address, the Employer's destination address, cable part number and specification as to the type of cable, length, number of fibres, a unique drum number & segment no., factory inspection stamp and date.
- (b) **Cable Drums:** All optical fibre cabling shall be supplied on sturdy, corrosion resistant, steel drums suitable for long periods of storage and re-transport & handling provided with lagging of adequate strength, constructed to protect the cabling against all damage and displacement during transit, storage and subsequent handling during installation. Both ends of the cable shall be sealed as to prevent the escape of filling compounds and dust & moisture ingress during shipment and handling. Spare cable caps shall be provided with each drum as required.

There shall be no factory splices allowed within a continuous length of cable. Only one continuous cable length shall be provided on each drum. The lengths of cable to be supplied by the contractor on each drum shall be between 4-5kms. However length of cable higher than 5 kms, if required, may also be supplied in single drum. Same shall be discussed & finalised during the detailed engineering.

Optical Ground Wire (OPGW)

OPGW cable construction shall comply with IEEE-P1138 and IEC publication 1396. The cable provided shall meet both the construction and performance requirements such that the ground wire function, the optical fibre integrity and optical transmission characteristics are suitable for the intended purpose.

The composite fibre optic overhead ground wire shall be made up of buffered optical fibre units embedded in a water tight aluminium/aluminium alloy/stainless steel protective central fibre optic unit surrounded by concentric-lay stranded metallic wires in single or multiple layers. However, other material may be accepted subject to meeting the cable type-testing requirements as specified in the technical specifications. The dual purpose of the composite cable is to provide the electrical and physical characteristics of conventional overhead ground wire while providing the optical transmission properties of optical fibre.

Central Fibre Optic Unit

The central fibre optic unit shall be designed to house and protect multiple buffered optical fibre units from damage due to forces such as crushing, bending, twisting, tensile stress and moisture. The central fibre optic unit and the outer stranded metallic conductors shall serve together as an integral unit to protect the optical fibres from degradation due to vibration and galloping, wind and ice loadings, wide temperature variations, lightning and fault current, as well as environmental effects which may produce hydrogen. The central fibre optic unit may include an aluminium tube and/or channelled aluminium rod.

Basic Construction

The cable construction shall conform to the applicable requirements of Technical Specification, applicable clauses of IEC 1089 related to stranded conductors and Table 2.2(a) OPGW Mechanical and Electrical Characteristics. In addition, the basic construction shall include bare concentric-lay-stranded metallic wires with the outer layer having left hand lay. The wires may be of multiple layers with a combination of various metallic wires within each layer. The direction of lay for each successive layer shall be reversed.

Breaking Strength

The rated breaking strength of the completed OPGW shall be taken as no more than 90 percent of the sum of the rated breaking strengths of the individual wires, calculated from their nominal diameter and the specified minimum tensile strength.

The rated breaking strength **shall not include the strength of the optical unit**. The fibre optic unit shall not be considered a load bearing tension member when determining the total rated breaking strength of the composite conductor.

Electrical and Mechanical Requirements

Table 2-2(a) provides OPGW Electrical and Mechanical Requirements for the minimum performance characteristics. Additionally, the OPGW mechanical & electrical characteristics shall be similar to the electrical & mechanical characteristics of the (7/3.66) GI earthwire. The earthwire parameters are listed in tender specification Section –IV B –Part (ii). For the purposes of determining the appropriate Max Working Tension limit for the OPGW cable, IS 802:1995 and IS 875: 1987 shall be applied. However the OPGW sag & tension charts shall be based on IS 802. For the OPGW cable design selection and preparation of sag tension charts, the limits specified in this section shall also be satisfied. The Bidder shall submit sag-tension charts for the above cases with their bids.

Table 2.2(a)
OPGW Electrical and Mechanical Requirements

(1)	Everyday Tension at 32°C, no wind:	≤ 20% of UTS of OPGW
(2)	D.C. Resistance at 20°C:	< 1.0 ohm/Km
(3)	Short Circuit Current:	≥6.32 kA for 1.0 second

Operating conditions

Since OPGW shall be located at the top of the EHV transmission line support structure, it will be subjected to Aeolian vibration, Galloping and Lightning strikes. It will also carry ground fault currents. Therefore, its electrical and mechanical properties shall be the same or similar as those required of conventional ground wire as listed in tender specification Section –IV B –Part (ii).

Installation Hardware

The scope of supply of the optical cable includes the assessment, supply and installation of all required fittings and hardware. The Contractor shall determine the exact requirements of all accessories required to install and secure the OPGW.

The OPGW hardware fittings and accessories shall follow the general requirements regarding design, materials, dimensions & tolerances, protection against corrosion and markings as specified in §4.0 of EN 61284: 1997 (IEC 61284). The shear strength of all bolts shall be at least 1.5 times the maximum installation torque. The Contractor shall provide the OPGW hardware & accessories drawing & Data Requirement Sheets (DRS) document for all the assemblies & components. However, DRS format of assemblies has been enclosed in the appendices. All component reference numbers, dimensions and tolerances, bolt tightening torques & shear strength and ratings such as UTS, slip strength etc shall be marked on the drawings.

The fittings and accessories described herein are indicative of installation hardware typically used for OPGW installations and shall not necessarily be limited to the following:

- (a) **Suspension Assemblies:** Preformed armour grip suspension clamps and aluminum alloy armour rods/ reinforcing rods shall be used. The suspension clamps shall be designed to carry a vertical load of not less than 25 KN. The suspension clamps slippage shall occur between 12kN and 17 kN as measured in accordance with type test procedures specified in APPENDIX A,.

The Contractor shall supply all the components of the suspension assembly including shackles, bolts, nuts, washers, split pins, etc. The total drop of the suspension assembly shall not exceed 150 mm (measured from the centre point of attachment to the centre point of the OPGW).

- (b) **Dead End Clamp Assemblies:** All dead end clamp assemblies shall preferably be of the performed armoured grip type and shall include all necessary hardware for attaching the assembly to the tower strain plates. Dead end clamps shall allow the OPGW to pass through continuously

without cable cutting. The slip strength shall be rated not less than 95% of the rated tensile strength of the OPGW.

- (c) **Clamp Assembly Earthing Wire:** Earthing wire consisting of a 1500 mm length of aluminium or aluminium alloy conductor equivalent in size to the OPGW shall be used to earth suspension and dead end clamp assemblies to the tower structure. The earthing wire shall be permanently fitted with lugs at each end. The lugs shall be attached to the clamp assembly at one end and the tower structure at the other.
- (d) **Structure Attachment Clamp Assemblies:** Clamp assemblies used to attach the OPGW to the structures, shall have two parallel grooves for the OPGW, one on either side of the connecting bolt. The clamps shall be such that clamping characteristics do not alter adversely when only one OPGW is installed. The tower attachment plates shall locate the OPGW on the inside of the tower and shall be attached directly to the tower legs/cross-members without drilling or any other structural modifications.
- (e) **Vibration Dampers:** Vibration dampers type 4R Stockbridge or equivalent, having four (4) different frequencies spread within the Aeolian frequency bandwidth, shall be used for suspension and tension points in each span. The Contractor shall determine the exact numbers and placement(s) of vibration dampers through a detailed vibration analysis as specified in appendices. Vibration damper clamps shall be made of aluminium or aluminium alloy, shall support the dampers during installation and shall maintain the dampers in position without damage to the OPGW and without causing fatigue. Armour or patch rods made of aluminium or aluminium alloy shall be provided as required to reduce clamping stress on the OPGW. The vibration damper body shall be hot-dip galvanized mild steel/cast iron or shall be permanent mould cast zinc alloy.

In-Line Fibre Optic Splice Enclosures

All in-line splices shall be encased in In-Line Fibre Optic Splice Enclosures. Suitable splice enclosures shall be provided to encase the optical cable splices in a protective, moisture and dust free environment. In line splice enclosures shall comply to ingress protection class IP 66 or better. The splice enclosures shall be designed for the storage and protection of a minimum of 16/08 optical fibre splices and equipped with sufficient number of splice trays for splicing all fibres in the cable. In-line splice enclosures shall be suitable for outdoor use with each of the cable types provided under this contract. Splice enclosures shall be appropriate for mounting on EHV transmission towers above anti-climb guard levels at about 10 metres from the ground level and shall accommodate pass-through splicing.

9. INSPECTION & TESTING REQUIREMENTS

This section describes the specific requirements for inspection & testing requirement for supply of OPGW cable & its associated hardware & fittings.

9.1 General

All materials furnished and all work performed under this Contract shall be inspected and tested. Deliverables shall not be shipped until all required inspections and tests have been completed, and all deficiencies have been corrected to comply with this Specification and approved for shipment by the Employer.

The entire cost of testing type test, factory acceptance test, routine tests, production tests and other test during manufacture specified herein shall be treated as included in the quoted unit price of materials, except for the expenses of Inspector/Employer's representative.

9.2 Testing Requirements

Following are the requirements of testing for supply of OPGW Cable:

1. Type Testing
2. Factory Acceptance Testing

9.3 Type Testing

"Type Tests" shall be defined as those tests which are to be carried out to prove the design, process of manufacture and general conformity of the materials to this Specification.

9.3.1 Type Test Samples

The Contractor shall supply equipment/material for sample selection only after the Quality Assurance Plan has been approved by the Employer. The sample material shall be manufactured strictly in accordance with the approved Quality Assurance Plan. The Contractor shall submit for Employer approval, the type test sample selection procedure. The selection process for conducting the type tests shall ensure that samples are selected at random. For optical fibres/ Fibre Optic cables, at least three reels/ drums of each type of fibre/ cable proposed shall be offered for selection. For FO cable installation hardware & fittings at least ten (10) samples shall be offered of which at least three samples shall be selected by the Employer's representative. For In line Splice enclosures and other equipment at least three samples shall be offered, of which one sample shall be selected.

9.3.2 List of Type Tests

The list of required type tests is given in APPENDIX A.

9.4 Factory Acceptance Tests (FAT)

Factory acceptance tests shall be conducted on randomly selected final assemblies of a Fibre Optic Cable & associated hardware & accessories to be supplied. Factory acceptance testing shall be carried out on overhead fibre optic cable (OPGW) & FO cable hardware fittings & accessories, splice enclosures and all other items for which price has been identified separately in the Price bid Schedules.

9.4.1 Sampling for FAT

From each batch of equipment presented by the Contractor for Factory acceptance testing, the Employer shall select random sample(s) to be tested for acceptance. Unless otherwise agreed, all required FAT tests in the approved FAT procedures, shall be performed on all samples. The Sampling rate for the Factory acceptance tests shall be minimum 10% of the batch size (minimum 1) for all items. In case any of the selected samples fail, the failed sample is rejected and additional 20% samples shall be selected randomly and tested. In case any sample from the additional 20% also fails the entire batch may be rejected. Physical inspection shall be carried out on 100% basis for all the equipment/items offered.

For the FO cable hardware fittings & accessories, the minimum sampling rate, and batch acceptance criteria shall be as defined in IS 2486.

Since FAT testing provides a measure of assurance that the Quality Control objectives are being met during all phases of production, the Employer reserves the right to require the Contractor to investigate and report on the cause of FAT failures and to suspend further testing/ approvals until such a report is made and remedial actions taken, as applicable.

9.4.2 Production Testing

Production testing shall mean those tests which are to be carried out during the process of production by the Contractor to ensure the desired quality of end product to be supplied by him. The production tests to be carried out at each stage of production shall be based on the Contractor's standard quality assurance procedures. The production tests to be carried out shall be listed in the Manufacturing Quality Plan (MQP), along with information such as sampling frequency, applicable standards, acceptance criteria etc.

The production tests would normally not be witnessed by the Employer. However, the Employer reserves the right to do so or inspect the production testing records in accordance with Inspection rights specified for this contract.

10. VENDER LIST FOR OPGW CABLE AND OPGW ASSOCIATED HARDWARE & FITTINGS

List of approved vendor for supply of OPGW CABLE & OPGW ASSOCIATED HARDWARE FITTINGS are as under. The bidders are required to submit the GTP / Drawings etc. from the vendor for approval.

Sl. No.	Item(s)	Name of Sub-vendor
1	“OPGW ” Cable	<p>Sub- vendor shall be manufacturer of OPGW who has been manufacturing OPGW for the last three (3) years and at least 500 km of OPGW manufactured by such manufacturer shall have been in satisfactory operation on 400 kV or higher voltage EHV transmission lines for at least two(2) years as on the date of opening of Bids.</p> <p>Vender who have already supplied similar OPGW cable to M/s PGCIL and the same is in satisfactory operation on 400 kV or higher voltage EHV transmission lines for at least three (3) years as on the date of opening of Bids. (Proof of supply & performance certificate for successful operation form last three years should be submitted)</p>
2	OPGW Associated Hardware & fittings	<p>Sub- vendor shall be manufacturer of OPGW ASSOCIATED HARDWARE & FITTINGS who has been manufacturing OPGW ASSOCIATED HARDWARE & FITTINGS for the last three (3) years and by such manufacturer shall have been in satisfactory operation on 400 kV or higher voltage EHV transmission lines for at least two(2) years as on the date of opening of Bids.</p> <p>Vender who have already supplied similar OPGW ASSOCIATED HARDWARE & FITTINGS to M/s PGCIL and the same is in satisfactory operation on 400 kV or higher voltage EHV transmission lines for at least three (3) years as on the date of opening of Bids. (Proof of supply & performance certificate for successful operation form last three years should be submitted)</p>

APPENDIX A

TYPE TESTING / FACTORY ACCEPTANCE TESTING PROCEDURES / REQUIREMENTS

Wherever the referenced test procedures or the technical specifications call for visual inspection for damage, the test report shall include a full description of observed status of the sample. (Visually inspected samples shall also be colour photographed and copies of colour photographs shall be included in type test report)

B-1 Type Tests for Optical Fibres

The type tests listed below in table B-1.1 shall be conducted on DWSM fibres. The tests specific to the cable type are listed in subsequent sections.

Table B-1.1

Type Tests For Optical Fibres

S.No.	Test Name	Acceptance Criteria	Test procedure
1	Attenuation	AS per Section-02 of TS, Volume II	EIA/TIA 455- 78A
2	Attenuation Variation with Wavelength	AS per Section-02 of TS, Volume II	EIA/TIA 455- 78A
3	Attenuation at Water Peak	AS per Section-02 of TS, Volume II	EIA/TIA 455- 78A
4	Temp. Cycling (Temp dependence of Attenuation)		EIA/TIA 455- 3A, 2 cycles
5	Attenuation With Bending (Bend Performance)		EIA/TIA 455- 62A
6	Mode Field dia.		EIA/TIA 455- 164A/167A/174
7	Chromatic Dispersion		EIA/TIA 455- 168A/169A/175A
8	Cladding Diameter		EIA/TIA 455-176
9	Point Discontinuities of attenuation		EIA/TIA 455-59
10	Core -Clad concentricity error		EIA/TIA 455-176
11	Fibre Tensile Proof Testing		EIA/TIA 455-31B

B-2 Type Tests For OPGW Cables

The type tests to be conducted on the OPGW cable are listed in table B-2.1: Type Tests for OPGW Cables. Unless specified otherwise in the technical specifications or the referenced standards, the optical attenuation of the specimen, measured during or after the test as applicable, shall not increase by more than 0.05 dB/Km.

Table B-2.1

Type tests for OPGW Cable

S.NO.	Test Name	Test Description	Test Procedure	
1	Water Ingress Test	IEEE 1138 Section 4.1.1.1	IEEE 1138, Section 5.1.1.1 (IEC 794-1-F5 /EIA/TIA 455-82B) : Test duration : 24 hours	
2	Seepage of filling compound	IEEE 1138 Section 4.1.1.2	IEEE 1138 Section 5.1.1.2 (EIA/TIA 455-81B)	Preconditioning period : 72 hours. Test duration : 24 hours.
3	Short Circuit Test	IEEE 1138 Section 4.1.1.3 Or	IEEE 1138 Section 5.1.1.3	Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means. A suitable temperature sensor such as thermocouple shall be used to monitor and record the temperature inside the OPGW tube in addition to monitoring & recording the temperatures between the strands and between optical tube and the strand as required by IEEE 1138. Test shall be conducted with the tension clamps proposed to be supplied. The cable and the clamps shall be visually inspected for mechanical damage and photographed after the test.
		IEC 60794-1-2 (2003) Method H1		Initial temperature during the test shall be greater than or equal to ambient field temperature. However, maximum temperature recorded on any component of OPGW cable shall not exceed the Short Circuit transient peak temperature guaranteed by the Contractor during design.
4	Aeolian Vibration Test	IEEE 1138	IEEE 1138	Fibre attenuation shall be continuously monitored and recorded through a digital

Table B-2.1**Type tests for OPGW Cable**

S.NO.	Test Name	Test Description	Test Procedure	
		Section 4.1.1.4	Section 5.1.1.4	<p>data logging system or equivalent means.</p> <p>The vibration frequency and amplitude shall be monitored and recorded continuously. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring.</p> <p>Test shall be conducted with the tension/suspension clamps proposed to be supplied. The cable and the clamps shall be visually inspected for mechanical damage and photographed after the test.</p>
5	Galloping test	IEEE 1138 Section 4.1.1.5	IEEE 1138 Section 5.1.1.5	Test shall be conducted with the tension/suspension clamps proposed to be supplied. The cable and clamps shall be visually inspected for mechanical damage and photographed after the test. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring.
6	Cable Bend Test	Procedure 2 in IEC:794-1-E11		The short-term and long-term bend tests shall be conducted in accordance with Procedure 2 in IEC:794-1-E11 to determine the minimum acceptable radius of bending without any increase in attenuation or any other damage to the fibre optic cable core such as bird caging, deformation, kinking and crimping.
7	Sheave Test	IEEE 1138 Section 4.1.1.6 Or IEC 60794-1-2 (2003) Method E18B	IEEE 1138 Section 5.1.1.6	<p>Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means.</p> <p>The Sheave dia. Shall be based on the pulling angle and the minimum pulley dia employed during installation. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring.</p>
8	Crush Test		IEEE 1138 Section	The crush test shall be carried out on a sample of approximately one (1) metre

Table B-2.1

Type tests for OPGW Cable

S.NO.	Test Name	Test Description	Test Procedure	
		IEEE 1138 Section 4.1.1.7	5.1.1.7 (IEC 794-1-E3/ EIA/TIA 455-41B)	long in accordance with IEC:794-1-E3. A load equal to 1.3 times the weight of a 400-metre length of fibre optic cable shall be applied for a period of 10 minutes. A permanent or temporarily increase in optical attenuation value greater than 0.1 dB change in sample shall constitute failure. The load shall be further increased in small increments until the measured attenuation of the optical waveguide fibres increases and the failure load recorded along with results.
9	Impact Test	IEEE 1138 Section 4.1.1.7	IEEE 1138, Section 5.1.1.7 (IEC 794-1-E4/ EIA/TIA 455-25B)	The impact test shall be carried out in accordance with IEC:794-1-E4. Five separate impacts of 0.1-0.3kgm shall be applied. The radius of the intermediate piece shall be the reel drum radius \pm 10%. A permanent or temporary increase in optical attenuation value greater than 0.1 dB/km change in sample shall constitute failure.
10	Creep Test	IEEE 1138 Section 4.1.1.8	IEEE 1138 Section 5.1.1.8	As per Aluminium Association Method , the best-fit straight line shall be fitted to the recorded creep data and shall be extrapolated to 25 years. The strain margin of the cable at the end of 25 years shall be calculated. The time when the creep shall achieve the strain margin limits shall also be calculated.
11	Fibre Strain Test	IEEE 1138 Section 4.1.1.9	IEEE 1138 Section 5.1.1.9	
12	Strain Margin Test	IEEE 1138 Section 4.1.1.10	IEEE 1138 Section 5.1.1.10	

Table B-2.1**Type tests for OPGW Cable**

S.NO.	Test Name	Test Description	Test Procedure
13	Stress strain Test	IEEE 1138 Section 4.1.1.11	IEEE 1138 Section 5.1.1.11
14	Cable Cut-off wavelength Test	IEEE 1138 Section 4.1.1.12	IEEE 1138 Section 5.1.1.12
15	Temperature Cycling Test	IEEE 1138 Section 4.1.1.13	IEEE 1138 Section 5.1.1.13
16	Corrosion (Salt Spray) Test	EIA/TIA 455-16A	
17	Tensile Performance Test	IEC 794-1-E1 / EIA/TIA 455-33A	<p>The test shall be conducted on a sample of sufficient length in accordance with IEC:794-1-E1. The attenuation variation shall not exceed 0.05 dB/kM up to 90% of RTS of fibre optic cable.</p> <p>The load shall be increased at a steady rate up to rated tensile strength and held for one (1) minute. The fibre optic cable sample shall not fail during the period. The applied load shall then be increased until the failing load is reached and the value recorded.</p>

Table B-2.1

Type tests for OPGW Cable

S.NO.	Test Name	Test Description	Test Procedure
18	Fault Current/ lightning Test	IEEE Std. 4-1978	<p>Tension equal to 20% of the OPGW RTS shall be applied to a sample with minimum length of 15 m of cabled fibres and two separate 4/10 micro second current impulses each having a peak value of 150 KA and a negative polarity shall be applied through a 1 cm gap. The attenuation during the tests shall be continuously measured. After the tests the same shall be visually inspected. Any increase in optical waveguide fibres attenuation measured at 1550 nm shall constitute failure.</p> <p>Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means.</p> <p>The tensile performance test shall be repeated on the sample subjected to the lightning arc test.</p>
		IEC 60794-1-2(2003)	The cable construction shall be tested in accordance with Method H2
19	DC Resistance Test	On a fibre optic cable sample of minimum 1 metre length, two contact clamps shall be fixed with a predetermined bolt torque. The resistance shall be measured by a Kelvin double bridge by placing the clamps initially zero metre and subsequently one metre apart. The tests shall be repeated at least five times and the average value recorded after correcting at 20°C.	

B-3 Type Test on OPGW Cable Fittings

The type tests to be conducted on the OPGW Cable fittings and accessories are listed below:

B-3.1 Mechanical Strength Test for Suspension/Tension Assembly

Applicable Standards : IS : 2486 / IEC : 61284 :1997.

Suspension Assembly

The armour rods /reinforcement rods are assembled on to the approved OPGW using the Installation Instructions to check that the assembly is correctly fitted and is the same that will be carried out during installations.

Part 1:

The suspension assembly shall be increased at a constant rate up to a load equal to 50% of the specified minimum Failure Load increased and held for one minute for the test rig to stabilise. The load shall then be increased at a steady rate to 67% of the minimum Failure Load and held for five minutes. The angle between the cable, the Suspension Assembly and the horizontal shall not exceed 16°. This load shall then be removed in a controlled manner and the Protection Splice disassembled. Examination of all the components shall be made and any evidence of visual deformation shall be documented.

Part 2:

The Suspension clamp shall then be placed in the testing machine. The tensile load shall gradually be increased up shall gradually be increased up to 50% of the specified Minimum Failure Load of the Suspension Assembly and held for one minute for the Test Rig to stabilise and the load shall be further increased at a steady rate until the specified minimum Failure Load is reached and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing load is reached and the value shall be documented.

Tension Assembly

The Tension Assembly is correctly fitted and is the same that will be carried out during installations.

Part 1:

The tension assembly (excluding tension clamp) shall be increased at a constant rate up to a load equal to 50% of the specified minimum Failure Load increased at a constant rate and held for one minute for the test rig to stabilise. The load shall then be increased at a steady rate to 67% of the minimum Failure Load and held for five minutes. This load shall then removed in a controlled manner and the Tension Assembly disassembled. Examination of the Tension Dead-End and associated components shall be made and any evidence of visual deformation shall be documented.

Part 2:

The Tension Dead-End and associated components shall then be reassembled and bolts tightened as before. The tensile load shall gradually be increased up shall gradually be increased up to 50% of the specified Minimum Failure Load of the Tension Assembly and held for one minute for the Test Rig to stabilise and the load shall be further increased at a steady rate until the specified minimum Failure Load is reached and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing load is reached and the value shall be documented.

Acceptance Criteria for Tension/Suspension Assembly:

- No evidence of binding of the Nuts or Deformation of components at end of part 1 of Test.
- No evidence of Fracture at the end of one minute at the minimum failure load during Part 2 of the Test.

Any result outside these parameters shall constitute a failure.

B-3.2 Clamp Slip Strength Test for Suspension Assembly

The suspension assembly shall be vertically suspended by means of a flexible attachment. A suitable length fibre optical cable shall be fixed in the clamps. Once the Suspension Clamp has been assembled, the test rig is tensioned to 1 kN and the position scale on the recorder 'zeroed'. The test rig is then tensioned to 2.5 kN and the relative positions of the Reinforcing Rods, Armour Rods and Suspension Clamp shall be marked by a suitable means to confirm any slippage after the test has been completed. The relative positions of the helical Armour Rods and associated Reinforcing Rods at each end shall be marked and also 2 mm relative position between clamp body and Armour Rods shall be marked on one side. The load shall be increased to 12 kN at a loading rate of 3 kN/min and held for one minute. At the end of this one minute period, the relative displacement between clamp body and the armour rods shall be observed. If the slippage is 2 mm or above, the test shall be terminated. Otherwise, at the end of one minute the position of the clamp body and 2 mm. relative position between clamp body and armour rods shall be marked on the other side. After the one minute pause, the load shall be further increased at a loading rate of 3 kN/min, and recording of load and displacement shall continue until either the relative Position displacement between clamp body and armour rods reaches more than 2 mm. or the load reaches the maximum slip load of 17 kN. On reaching either of the above values the test is terminated. Visual examination of all paint marks shall be recorded, and a measurement of any displacement recorded in the Table of Results.

Acceptance Criteria:

The Suspension Clamp has passed the Slip Test if the following conditions are met

- No slippage* shall occur at or below the specified minimum slip load.
 - * Definition of no slippage in accordance with IEC 61284:1997 :- Any relative movement less than 2 mm is accepted. The possible couplings or elongations produced by the cable as a result of the test itself are not regarded as slippage.
 - Slippage shall occur between the specified maximum and minimum slip load of 12 - 17 kN.
 - There shall be no slippage of the Reinforcing Rods over the cable, and no slippage of the Armour Rods over the Reinforcing Rods.
 - The relative movement (i.e. more than 2 mm between Armour Rods & Clamp body) between minimum 12 kN and maximum slip 17 kN, shall be considered as slip.
 - The Armour Rods shall not be displaced from their original lay or damaged**.
 - ** Definition of no damage in accordance with convention expressed in IEC 61284 : 1997 no damage, other than surface flattening of the strands shall occur.
- Any result outside these parameters is a failure.

B-3.3 Slip Strength Test of Tension Clamp

Tension clamps shall be fitted on a 8 m length of fibre optic cable on both ends. The assembly shall be mounted on a tensile testing machine and anchored in a manner similar to the arrangement to be used in service. A tensile load shall gradually be applied up to 20 % of the RTS of OPGW . Displacement transducers shall be installed to measure the relative movement between the OPGW relative to the Reinforcing Rods and Tension Dead -End relative to Reinforcing Rods. In addition, suitable marking shall be made on the OPGW and Dead-End to confirm grip. The load shall be gradually increased at a constant rate up to 50 % of the UTS and the position scale of the recorder is zeroed. The load shall then gradually increased up to 95 % of the UTS and maintained for one minute. After one minute pause, the load shall be slowly released to zero and the marking examined and measured for any relative movement.

Acceptance Criteria:

- No movement* shall occur between the OPGW and the Reinforcing Rods, or between the Reinforcing Rods and the Dead-End assembly.
- No failure or damage or disturbance to the lay of the Tension Dead-End, Reinforcing Rods or OPGW.

* Definition of no movement as defined in IEC 61284: Any relative movement less than 2 mm is accepted. The possible couplings or elongations produced by the conductor as a result of the test itself are not regarded as slippage.

Any result outside these parameters shall constitute a failure.

B-3.4 Grounding Clamp and Structure Mounting Clamp Fit Test

For structure mounting clamp, one series of tests shall be conducted with two fibre optic cables installed, one series of tests with one fibre optic cable installed in one groove, and one series of tests with one fibre optic cable in the other groove. Each clamp shall be installed including clamping compound as required on the fibre optic cable. The nut shall be tightened on to the bolt by using torque wrench with a torque of 5.5 kgm or supplier's recommended torque and the tightened clamp shall be held for 10 minutes. After the test remove the fibre optic cable and examine all its components for distortion, crushing or breaking. Also the fibre optic cable shall be checked to ensure free movement within the core using dial callipers to measure the diameter of the core tube. The material shall be defined as failed if any visible distortion, crushing, cracking or breaking of the core tube is observed or the fibre optic cable within the core tube is not free to move, or when the diameter of the core tube as measured at any location in the clamped area is more than 0.5 mm larger or smaller of the core diameter as measured outside the clamped area.

B-3.5 Structure Mounting Clamp Strength Test

The clamp and mounting assembly shall be assembled on a vertical 200 mm x 200 mm angle and a short length of fibre optic cable installed. A vertical load of 200 kg shall be applied at the end of the mounting clamp and held for 5 minutes. Subsequently, the load shall be increased to 400 kg and held for 30 seconds. Any visible distortion, slipping or breaking of any component of the mounting clamp or assembly shall constitute failure.

B-3.6 Type Test on Vibration Damper

B-3.6.1 Dynamic Characteristic Test:-

The damper shall be mounted with its clamp tightened with torque recommended by the manufacturer on shaker table capable of simulating sinusoidal vibrations for Critical Aeolian Vibration frequency band as determined through vibration analysis of undamped OPGW.. The damper assembly shall be vibrated vertically with a ± 1 mm amplitude from 5 to 15 Hz frequency and beyond 15 Hz at 0.5 mm to determine following characteristics with the help of suitable recording instruments.

- (a) Force Vs frequency
- (b) Phase angle Vs frequency
- (c) Power dissipation Vs frequency

The Force Vs frequency curve shall not show steep peaks at resonance frequencies and deep troughs between the resonance frequencies. The resonance frequencies shall be suitably spread within the Aeolian vibration frequency-band between the lower and upper dangerous frequency limits determined by the vibration analysis of fibre optic cable without dampers.

The above dynamic characteristics test shall be conducted on five dampers. The variations between the samples tested shall conform to the sample test limits.

B-3.6.2 Vibration Analysis

The vibration analysis of the fibre optic cable shall be done with and without damper installed on the span. The vibration analysis shall be done on a digital computer using energy balance approach. The following parameters shall be taken into account for the purpose of analysis.

- (a) The analysis shall be done for single fibre optic cable without armour rods. The tension shall be taken as max Permissible Every Day Tension (20% of UTS), for a span ranging from 100 m to 1100 m.

- (b) The self damping factor and flexural stiffness (EI) for fibre optic cable shall be calculated on the basis of experimental results. The details to experimental analysis with these data shall be furnished.
- (c) Examine the Aeolian Vibration level of the fibre optic cable with and without vibration damper installed at the recommended location or wind velocity ranging from 0 to 30 Km per hour, predicting amplitude, frequency and vibration energy input.
- (d) From vibration analysis of fibre optic cable without damper, antinode vibration amplitude and dynamic strain levels at clamped span extremities as well as antinodes shall be examined and thus lower and upper dangerous frequency limits between which the Aeolian vibration levels exceed the specified limits shall be determined.
- (e) From vibration analysis of fibre optic cable with damper(s) installed at the recommended location, the dynamic strain level at the clamped span extremities, damper attachment point and the antinodes on the fibre optic cable shall be determined. In addition to above damper clamp vibration amplitude and antinodes vibration amplitudes shall also be examined.

The dynamic strain levels at damper attachment point, clamped span extremities and antinodes shall not exceed the specified limits. The damper clamp vibration amplitude shall not be more than that of the specified fatigue limits.

B-3.7 Vibration Damper Clamp Slip and Fatigue Tests

B-3.7.1 Test Set Up

The clamp slip and fatigue tests shall be conducted on a laboratory set up with a minimum effective span length of 30m. The fibre optic cable shall be tensioned at 15 kN and shall not be equipped with protective armour rods at any point.

Constant tension shall be maintained within the span by means of lever arm arrangement. After the fibre optic cable has been tensioned, clamps shall be installed to support the fibre optic cable at both ends and thus influence of connecting hardware fittings are eliminated from the free span. The clamps shall not be used for holding the tension on the fibre optic cable. There shall be no loose parts, such as suspension clamps, U bolts, on the test span supported between clamps mentioned above. The span shall be equipped with vibration inducing equipment suitable for producing steady standing vibration. The inducing equipment shall have facilities for step less speed control as well as step less amplitude arrangement. Equipment shall be available for measuring the frequency, cumulative number of cycles and amplitude of vibration at any point along the span.

B-3.7.2 Clamp Slip Test

The vibration damper shall be installed on the test span. The damper clamp, after tightening with the manufacturer's specified tightening torque, when subjected to a longitudinal pull of 2.5 kN parallel to the axis of fibre optic cable for a minimum duration of one minute shall not slip, i.e., the permanent displacement between fibre optic cable and clamp measured after removal of the load shall not exceed 1.0 mm. The load shall be further increased until the clamp starts slipping. The load at which the clamp slips shall not be more than 5 kN.

B-3.7.3 Fatigue Test

The vibration damper shall be installed on the test span with the manufacturer's specified tightening torque. It shall be ensured that the damper shall be kept minimum three loops away from the shaker to eliminate stray signals influencing damper movement.

The damper shall then be vibrated at the highest resonant frequency of each damper mass. For dampers involving torsional resonant frequencies, tests shall be done at torsional modes also in addition to the highest resonant frequencies at vertical modes. The resonance frequency shall be identified as the frequency at which each damper mass vibrates with the maximum amplitude on itself. The amplitude of vibration of the damper clamp shall be maintained not less than $\pm 25/f$ mm where f is the frequency in Hz.

The test shall be conducted for minimum ten million cycles at each resonant frequency mentioned above. During the test, if resonance shift is observed, the test frequency shall be tuned to the new resonant frequency.

The clamp slip test as mentioned herein above shall be repeated after fatigue tests without retorquing or adjusting the damper clamp, and the clamp shall withstand a minimum load equal to 80% of the slip strength for a minimum duration of one minute.

After the above tests, the damper shall be removed from fibre optic cable and subjected to dynamic characteristics test. There shall not be any major deterioration in the characteristics of the damper. The damper then shall be cut open and inspected. There shall not be any broken, loose, or damaged part. There shall not be significant deterioration or wear of the damper. The fibre optic cable under clamp shall also be free from any damage.

For purposes of acceptance, the following criteria shall be applied:

- (i) There shall not be any frequency shift by more than ± 2 Hz for frequencies lower than 15 Hz and ± 3 Hz for frequencies higher than 15 Hz.
- (ii) The force response curve shall generally lie within guaranteed % variation in reactance after fatigue test in comparison with that before fatigue test by the Supplier.
- (iii) The power dissipation of the damper shall not be less than guaranteed % variation in power dissipation before fatigue test by the Supplier. However, it shall not be less than minimum power dissipation which shall be governed by lower limits of reactance and phase angle indicated in the envelope.

B-4 Type Tests for In Line Splice Enclosures

Following Type tests shall be demonstrated on the In Line Splice Enclosure(s) (Splice Enclosure/Box) . For certain tests, lengths of the fibre optic cable shall be installed in the splice box, and the fibres must be spliced and looped in order to simulate conditions of use. The attenuation of the fibres shall be measured, during certain tests, by relevant Fibre Optic Test Procedures (EIA/TIA 455 or IEC 794-1 procedures).

B-4.1 Temperature Cycling Test

FO cable is installed in the splice enclosure and optical fibres spliced and looped. The box must be subjected to 5 cycles of temperature variations of -40°C to $+65^{\circ}\text{C}$ with a dwell time of at least 2 hours on each extreme.

Fibre loop attenuation shall be measured in accordance with EIA 455-20/ IEC 794-1-C10. The variation in attenuation shall be less than $\pm 0.05\text{dB}$. The final humidity level, inside the box, shall not exceed the initial level, at the closing of the box.

B-4.2 Humid Heat test

The sealed splice enclosure, with fibres spliced and looped inside, must be subjected to a temperature of $+55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ with a relative humidity rate of between 90% and 95% for 5 days. The attenuation variation of the fibres during the duration of the test shall be less than $\pm 0.05\text{dB}$, and the internal humidity rate measured, less than 2% .

B-4.3 Rain Withstand Test

The splice enclosure with optical fibres cable installed and fibres spliced fixed, shall be subjected to 24 hours of simulated rain in accordance with IEC 60 testing requirements. No water seepage or moisture shall be detected in the splice enclosure. The attenuation variation of the fibres after the test shall be less than $\pm 0.05\text{dB}$.

B-4.4 Vibration Test

The splice enclosure, with fibres united inside, shall be subjected to vibrations on two axes with a frequency scanning of 5 to 50 Hz. The amplitude of the vibrations shall be constant at 0.450mm, peak to peak, for 2 hours, for each of the vibrations' axes. The variation in attenuation, of the fibres, shall be less than $\pm 0.05\text{dB}$. The splice enclosure shall be examined for any defects or deformation. There shall be no loosening or visible damage of the FO cable at the entry point.

B-4.5 Bending and Torsion test

The splice enclosure, with fibres spliced inside, shall be firmly held in place and be subjected to the following sequence of mechanical stresses on the cable:

- a) 3 torsion cycles of $\pm 180^{\circ}$ shall be exercised on the cable. Each cycle shall be less than one minute.
- b) 3 flexure cycles of the cable, of $\pm 180^{\circ}$ with one cycle less than one minute.

The variation in the attenuation, of the fibres, shall be less than $\pm 0.05\text{dB}$. The cables connection ring shall remain securely fixed to the box with the connection maintained firmly. No defects/fissures shall be noted on the joint ring or on the splice enclosure

B-4.6 Tensile test

The splice enclosure with cable fixed to the boxes shall be subjected to a minimum tension of 448 N for a period of two minutes. No fissure shall be noted in the connections or on the box.

B-4.7 Drop Test

With 2 lengths of 10 metres of cable fixed to the box, it shall be dropped five times from a height of 11 metres. There shall be no fissure, at all, of the box, and the connections shall remain tight. The test shall be carried out in accordance with procedure described in IEC-68-2-32.

B-5 Factory Acceptance Tests On Fibre Optic Cables

As specified in technical specifications, the Factory acceptance tests shall be conducted on random sampling of fibre optic cable to be supplied for the present procurement, prior to any shipment.

B-5.1 FAT On Fibre : Optical Acceptance Tests

The Optical acceptance tests listed in table B-5.1 below are applicable for the fibres of all types of Fibre Optic Cables i.e. OPGW and approach cable to be supplied. The listed tests follow testing requirements set forth in IEEE standard 1138 section 4.2.2.1 and section 5.2.2.1. The referenced sections specify the detailed test description. The acceptance norm shall be as specified in the above mentioned IEEE standards unless specified otherwise in the technical specifications.

Table B-5.1
Factory Acceptance Tests for Fibres of all FO cables: Optical Tests

S.No.	Test Name	Acceptance Criteria	Test procedure	
1	Attenuation Coefficient	AS per Section-02 of TS, Volume II	EIA/TIA 455- 78A	
2	Point Discontinuities of attenuation	AS per Section-02 of TS, Volume II	EIA/TIA 455-59	
3	Attenuation at Water Peak	AS per Section-02 of TS, Volume II	EIA/TIA 455- 78A	
4	Chromatic Dispersion		EIA/TIA 455-168A/169A/175A	
5	Core – Clad Concentricity Error		EIA/TIA 455-/176	
6	Cladding diameter		EIA/TIA 455-176	
7	Fibre Tensile Proof Testing		EIA/TIA 455-31B	

The test reports for the above tests for all types of the fibres carried out by the Fibre Manufacturer and used in the OPGW cables and approach cable shall be shown to the inspector during OPGW cable FAT and shall be submitted along with the OPGW cable FAT report.

B-5.2 Factory Acceptance Test On OPGW Cable

The factory acceptance tests for OPGW cable specified below in Table B-5.2 follow the requirements set forth in section 4.1.2 and section 5.1.2 of IEEE standard 1138. The FAT shall be carried out on 10% of offered drums in each lot as specified in technical specifications and the optical tests shall be carried out in all fibres of the selected sample drums. The Rated Tensile Strength test shall be carried out on one sample in each lot.

Table B-5.2**Factory Acceptance Tests On OPGW
Applicable standard: IEEE 1138**

S. No.	Factory Acceptance Test on Manufactured OPGW
1	Attenuation Co-efficient at 1310 nm and 1550 nm
2	Point discontinuities of attenuation
3	Visual Material verification and dimensional checks as per approved DRS/Drawings
4	Rated Tensile Strength
5	Lay Length Measurements

B-5.3 Factory Acceptance Test On OPGW Fittings

The factory acceptance tests for OPGW Fittings as specified below in Table B-5.3. The sampling plan shall be as per IS 2486:

Table B-5.3
Factory Acceptance Tests On OPGW Fittings

S. No.	Factory Acceptance Test
Suspension Assembly	
1	UTS/Mechanical Strength of the assembly
2	Clamp Slip Test
3	Visual Material verification and dimensional checks as per approved DRS/Drawings
4	Mechanical strength of each component
Tension Assembly	
5	Clamp Slip Strength test
6	Visual Material verification and dimensional checks as per approved DRS/Drawings
7	Mechanical strength of each component
Vibration Damper	
8	Galvanising test on damper, masses and messenger wires
9	Damper response (resonant frequencies)
10	Clamp Slip test
11	Strength of messenger wires
12	Mass pull off test
13	Visual Material verification and dimensional checks as per approved DRS/Drawings
Structure Mounting Clamp	
14	Clamp fit test
15	Clamp Strength test
16	Visual Material verification and dimensional checks as per approved DRS/Drawings

B-5.4 Factory Acceptance Test on In Line Splice Enclosures

The factory acceptance tests for In Line Splice Enclosures as specified below in Table B-5.4:

Table B-5.4
Factory Acceptance Tests on In Line Splice Enclosures

S. No.	Factory Acceptance Test
1	Visual check Kit Quantities and Specific Component Number for each component of In Line Splice Enclosure and dimensional checks against the approved drawings.

APPENDIX

DATA REQUIREMENT SHEETS

The DRS forms have been included for the major items, however, the DRS for each item along with sufficient details shall be submitted

The following sets of Data Requirement Sheets are required to be filled up by the bidders to aid in the evaluation process. The response shall be brief and to the point and shall be supported by the printed product description and other literature. The same DRS format duly filled and the relevant drawings shall also be submitted during the detailed engineering along with the relevant technical brochures.

DRS Form 1			
<u>DATA REQUIREMENTS SHEETS for OVERHEAD FIBRE OPTIC CABLE</u>			
OPTICAL GROUND WIRE (OPGW):			
Manufacturer: _____			
Part #: _____			
CABLE CONSTRUCTION			
Seq	Parameter:	Unit:	Particulars:
1	Fibre ManufacturerDual Window Single-Mode:		
2	No. of FibresDual Window Single-Mode:	each	
3	Buffer Type:		
4	Buffer Tube Diameter:	mm	
5	Buffer Tube material		
6	No. of Buffer Tubes:	each	
7	No. of Fibers per Tube:	each	
8	Identification/numbering of individual tubes:		
9	No. of empty tubes (If any):	each	
10	Filling material:		
11	Filling material compliant with technical specifications?	Yes/No	
12.	Strength member(s):		
13.	Binding yarn/ tape:		

14	<u>Describe Central Core Design:</u>		
15	20% Aluminum Clad steel wire Diameter: Number:	mm each	
16	Aluminum alloy wires Diameter: Number:	mm each	
17	Aluminum tube inner diameter:	mm	
18	Aluminum tube outside diameter:	mm	
19	Cable Diameter: (nominal \pm deviation)	mm	
20	Cable cross-section area (Nominal):	mm ²	
21	Cable cross-section area (Effective):	mm ²	
22	Fully Compliant with IEEE P1138:	Yes/No	
23	Mechanical Properties of Cable		
24	Max. breaking load/ Ultimate Tensile Strength (UTS):	kN	
25	Fibre strain margin:	%	
26	Zero fibre strain up to load	kN	
27	Weight:	kg/km	
28	Crush strength:	kg/mm	
29	Equivalent Modulus of elasticity:	KN/mm ²	
30	Minimum Bending Radius without microbending:	mm	
31	Maximum Bending Radius: Short Term: Long Term (Continuous):	mm	
32	Tensile proof test (Screening) level:	KN/mm ²	

33	Maximum permissible tensile stress:	KN/mm ²	
34	Permissible CTS. tensile stress:	KN/mm ²	
35	Maximum sag at maximum temperature and design span with no wind:	mm	
36	Everyday tension , no wind:	% of UTS	
37	Maximum tension at Every day condition with full wind pressure ofKg/m ² on full projected are, 400 meter span:	Kg	
	Thermal Properties of Cable		
38	Coefficient of linear expansion:	per °C	
39	Coefficient of expansion		
	Cladding: Core:	per °C per °C	
40	Nominal operating temperature range:	°C	
41	SC current transient peak temperature:	°C	
42	Maximum allowable temperature for lightning strike:	°C	
	CABLE SPOOL and DRUM		
43	Available length per spool Maximum: Nominal:	m	
44	Size of drum:	m	
45	Weight of empty drum:	kg	
46	Weight of drum with cable: spooled	kg	
47	Will drum length scheduling be practiced to match transmission line span lengths?	Yes/No	
48	<u>Describe Drum materials:</u>		
49	<u>Describe cable end capping and protection against abrasion etc.:</u>		
	INSTALLATION		

50	Splice Loss: Maximum: Average:	dB dB	
51	Operating Temperature Range:	°C	
52	Rated Isoceraunic No.		
53	Expected Cable Life:	Years	
54	Installation rate per team:	km/day	
55	No. of persons per team:	no.	
56	Max. possible span for specified operating conditions:	m	
57	Midspan sag at 0°C with no wind loading:	mm	
58	Midspan sag at max temp. with no wind loading:	mm	
59	Midspan sag at max temp. and wind loading	mm	
60	Cable swing angles: Worst Case: Everyday:		
61	<u>Describe Installation method(s):</u>		

Sag tension chart parameters like sag and tension at various spans and applicable wind and ice load conditions shall be submitted along with the DRS. The cable parameters like coefficient of liner expansion, modulus of elasticity shall also be indicated.

DRS Form 2

DATA REQUIREMENTS SHEETS for OPTICAL FIBRE
DUAL-WINDOW SINGLE MODE (DW-SM)

OPTICAL PARAMETERS			
Seq	Parameter:	Unit:	Particulars:
1.	Fiber manufacturer(s)/Type:		
2.	Fiber production method:		
3.	Attenuation Coefficient@ 1310 nm: @ 1550 nm:	dB/km dB/km	
4.	Attenuation Variation with Wavelength (± 25 nm):	dB/km	
5.	Attenuation at water peak:	dB/km	
6.	Point discontinuity @ 1310nm: @ 1550nm:	dB dB	
7.	Temperature dependence (induced attenuation):	dB	
8.	Nominal Mode Field Diameter @ 1310 nm: @ 1550 nm:	μm	
9.	Mode Field Diameter Deviation @ 1310 nm: @ 1550 nm:	μm	
10.	Mode field non-circularity:	%	
11.	Chromatic Dispersion Coefficient @ 1310 (1288-1339) nm: @ 1310 (1271-1360) nm: @ 1550 nm:	ps/nm.km	
12.	Zero dispersion wavelength:	nm	
13.	Zero dispersion Slope:	ps/nm ² .km	
14.	Cutoff wavelength:	nm	
15.	Refractive Index:		
16.	Refractive Index profile:		
17.	Cladding Design:		

18.	Numerical aperture:		
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PHYSICAL and MECHANICAL PROPERTIES			
Seq	Parameter:	Unit:	Particulars:
19.	Bend Performance: (37.5 mm radius, 100 turns) @1310 nm & @ 1550 nm (16mm radius, 1 turn) @1550 nm	dB dB	
20.	Core Diameter(nominal \pm deviation):	μm	
21.	Core non-circularity:	%	
22.	Cladding Diameter (nominal \pm deviation):	μm	
23.	Core- Clad concentricity Error:	μm	
24.	Cladding noncircularity:	%	
25.	Fibre cut-off wavelength	μm	
26.	Protective Coating type & material Primary: Secondary:		
27.	Protective Coating Diameter (nominal \pm deviation):	μm	
28.	Protective Coating removal method:		
29.	Coating Concentricity	μm	
30.	Polarisation mode dispersion coefficient	ps/km ^{1/2}	
31.	Proof test level	kpsi	
32.	Colour coding scheme compliant with EIA/TIA 598 or IEC 60304 or Bellore GR-20.	Yes/No	
33.	Colouring material compliant with technical specs?	Yes/No	

DRS Form 3-A
DATA REQUIREMENTS SHEETS for
HARDWARE AND ACCESSORIES

Suspension Clamp Assembly:

Manufacturer: _____

Part #: _____

ITEM	DESCRIPTION	UNIT	PARTICULARS
1.	Minimum vertical Strength	kN	
2.	Maximum Slip Strength	kN	
3.	Minimum Slip Strength	kN	
4.	Length (nominal)	mm	
5.	Weight (nominal)	kg	
6.	Total Drop (maximum) including shackles	mm	
7.	Tightening torque (nominal)	Nm	
8.	Details of Armour Rod Set		
	a) No. of rods per clamp		
	b) Direction of Lay		
	c) Overall length	mm	
	d) Diameter of each Rod	mm	
	e) Tolerances		
	(i) Diameter of each rod	<input type="checkbox"/> ±%	
	(ii) Length of each rod	<input type="checkbox"/> ±%	
	f) Material of manufacture		
	g) UTS of each Rod	kN	
	h) Weight	kg	
	Details of Protection Splice Set (Reinforcing Rods)		
	i) No. of rods per clamp		
	j) Direction of Lay		
	k) Overall length	mm	
	l) Diameter of each Rod	mm	
	m) Tolerances		
	(i) Diameter of each rod	<input type="checkbox"/> ±%	
	(ii) Length of each	<input type="checkbox"/> ±%	
	n) Material of manufacture		
	o) UTS of each Rod	kN	
	p) Weight	kg	

DRS Form 3-B

**DATA REQUIREMENTS SHEETS for
HARDWARE AND ACCESSORIES**

Dead End Clamp Assembly:

Manufacturer: _____

Part #: _____

ITEM	DESCRIPTION	UNIT	PARTICULARS
1.	Minimum Slip Load	kN	
2.	Length (nominal)		
	a) Reinforcing Rods	mm	
	b) Dead end	mm	
3.	Weight (nominal)		
	a) Reinforcing Rods	kg	
	b) Dead end	kg	
4.	Breaking strength (minimum)	kN	
5.	Wire Size		
	a) Reinforcing Rods	mm	
	b) Dead end	mm	

DRS Form 3-C

**DATA REQUIREMENTS SHEETS for
HARDWARE AND ACCESSORIES**

Vibration Damper:

Manufacturer: _____

Part #: _____

ITEM	DESCRIPTION	UNIT	PARTICULARS
i	Total Weight	Kg	
ii	Weight of each Damper	Kg	
iii	Material of Damper Weight		

vi	Clamp Material		
v	Clamp bolt tightening torque	Nm	
vi	Clamp bolt material		
vii	Messenger Cable Material		
i	No. of Strands in Messenger Cable		
ii	Breaking Strength of Messenger Cable	kN	
iii	Resonance Frequencies		
	a) First Frequency	Hz	
	b) Second Frequency	Hz	
	c) Third Frequency	Hz	
	d) Fourth Frequency	Hz	
iv	Minimum Slip Strength of Damper Clamp		
	a) Before Fatigue Test	kN	
	b) After fatigue Test	kN	

DRS Form 3-D

**DATA REQUIREMENTS SHEETS for
OPGW HARDWARES and ACCESSORIES**

Down Lead Clamp /Fastening Clamp

Manufacturer: _____

Part : _____

ITEM	DESCRIPTION	Unit:	Particulars:
1.	Material:		
2.	Suitable for OPGW (range):	mm	
3.	Tightening torques	Nm	
4.	Vertical load	kN	
5.	Filler details:		

(a)	Material		
(b)	diameter:	mm	
6.	Tower attachment arrangement		

DRS Form 4
DATA REQUIREMENTS SHEETS for
In Line Splice Enclosures

Manufacturer: _____
 Model _____

Seq	Parameter:	Unit:	Particulars:
1.	Dimensions H * W * D:	cm	
2.	Weight:	Kg	
3.	Colour and Finish:		
4.	Cable Glanding & Fixing:		
5.	Construction materials & Gauge:		
6.	Locking arrangements:		
7.	Installation Clearances: Front Access: Rear Access: Top * Bottom * Sides:	cm	
8.	IP Protection	Class	
9.	Total number of optical couplings:	ea	
10.	Provision of pass through splicing:	Yes/No	
11.	Whether filled with suitable encapsulant	Yes/No	
12.	Method(s) for mounting with the tower:		

Optical Fibre Cable Accommodations

13.	Cable Glanding:		
14.	Maximum number of cables that can be accommodated:	each	
15.	Diameter(s) of cables that can be accommodated:		

16. Describe Cable entries :

DRS Form 4 (Continued)

**DATA REQUIREMENTS SHEETS for
In Line Splice Enclosures**

Seq	Parameter:	Unit:	Particulars:
Cable Termination Splice Accomodations:			
17.	Details of Splice Trays:		
	Dimension:		
	Material/Gauge:		
	Weight:	kg	
	Colour & Finish:		
	Method of mounting:		
18.	Maximum number of splice trays:	ea	
19.	Number of splices per tray:	ea	
20.	Provision of Splice organisers:		
21.	Do splice trays require a separate enclosure? If so:	Yes/No	
	Manufacturer:		
	Dimensions H * W * D:	cm	
	Weight:	Kg	
	Colour and Finish:		
	Method(s) of Mounting:		
	Construction materials & Gauge:		
	Locking arrangements:		
	Installation Clearances Front Access: Rear Access: Top * Bottom * Sides:	m	
22.	Excess length of fibre service loops		

SECTION- IV B- (iii)**TECHNICAL SPECIFICATIONS OF INSULATOR****1.1 Standard Technical Particulars for Standard Disc Insulators**

The Disc Insulators to be supplied should confirm to IS:731(1971) with all the amendments made till to-day and as per technical particulars indicated herein. In addition to this magna spray flux test on the metallic portion of disc insulators should also confirm to standard prescribed for insulators. Please note, apart from acceptance test, mechanical tests as per IEC-383 is compulsory for acceptance of supply. However, the standard technical particulars of disc insulators shall be as follows:-

S.No.	Particulars	70 KN	90 KN	160 KN
1.	Type of Insulator (Pin & Cap)	Ball & Socket	Ball & Socket	Ball & Socket
2.	Size and designation of ball and socket with standard to which it will confirm	16 mmB Conforming 1974	16mmB to	20 mmB IS: 2486 (part-II)
3.	Dimension a) Porcelain disc diameter mm b) Unit spacing mm c) Creepage distance of single disc (min.) mm	255 +/-10 145 +/-4 320	255 +/-10 145 +/-4 320	280 +/-13 170 +/-5 330
4..	Colour of glaze of the finished porcelain insulator	Brown	Brown	Brown
5	Mechanical values . 1. Combined mechanical & electrical strength in KN 2. Materials used for ball pins. 3. Grade of material	70 KN Forged steel Class 3A or 4 of IS 2004	90 KN Forged steel Class 3A or 4 of IS 2004	160 KN Forged steel Class 3A or 4 of IS 2004
6	Ultimate tensile stress Kg. Per mm ²	63	63	71
7	Yield stress Kg. Per mm ²	32.5	32.5	47
8	Hardness test value BHN	175	175	201-255
9	Percentage elongation	(min. 15%)	(min. 15%)	(min. 14%)
10	Whether machine forced	Yes	Yes	Yes
11	Normalising particulars (Temp in C 0)	30-880	30-880	30-880
12	Withstand voltage of single disc a) Dry KV (RMS) b) Wet KV (RMS)	70 40	70 40	75 45
13	Impulse voltage 1.2 x 50 Micro sec. a) Positive KV (Peak) b) Negative KV (Peak)	110 110	110 100	130 130
14	Flesh over voltage for the disc. Power frequency : a) Dry KV (RMS) b) Wet KV (RMS)	78 45	78 45	80 50

15	Flesh over Impulse voltage 1.2 x 50 Micro sec. a) Positive KV (Peak) b) Negative KV (Peak)	120 120	120 120	140 140
16	P.F. Puncher voltage KV (RMS)	120	125	130
17	Min. Carona extinction voltage KV (RMS)	09	09	18
18	Max. RIV at 10 KV (RMS) Micro volts	50	50	50
19	Security clip/ locking device a) Type and dimension b) Material c) Standard to which security clip confirmed d) Test values	R TYPE and dimensions as per 2486 Part-IV Stainless steel Guaranteed as per IS 2486 (Part-IV) ---do--	R TYPE and dimensions as per 2486 Part-III) Stainless steel Guaranteed as per IS 2486 (Part-IV) ---do--	R TYPE and dimensions as per 2486 Part-III) Stainless steel Guaranteed as per IS 2486 (Part-IV) ---do--
20	Standard specification to which insulator will confirm	IS- 731 & IS-3188	IS- 731 & IS-3188	IS- 731 & IEC-383
21	Test required	As per IS 731 & IS 3188	As per IS 731 & IS 3188	As per IS 731 & IS 3188
22	Inter changeability of disc insulator	Required	Required	Required
23	Net weight of Insulator unit (Approx.)	5.8	5.8	8.5
24	Packing details i) Type of packing ii) No. of disc in each packing iii) Gross weight of each packing	Wooden crates 6 42	Wooden crates 6 42	Wooden crates 5 54

(2) INSULATOR STRINGS WITH HARDWARE FITTINGS:

The complete insulator string including Hardware fittings shall have the following characteristics:-

S. No.	Characteristics	Single/Double Suspension		Single/Double Tension	
		220 kV	132 kV	220 kV	132 kV
1	No. of Standard Discs	1x13 2x13	1x9 2x9	1x14 2x14	1x10 2x10
2	Nominal diameter of discs	255	255	280	255
3	Power frequency Withstand voltage (wet) kV (rms)	460	280	490	300
4	Lighting impulse withstand voltage (dry)(kVp)	1200	800	1200	800
5	Switching surge Withstand voltage (Dry & wet) (kVp)	900	350	900	350
6	Mechanical failing Load (kgf)	7000/ 14000	7000/ 14000	16500/ 33000	9000/ 18000
7	Pollution	Moderately polluted		Moderately polluted	
8	No deformation load (kgf)	4690/ 9380	4690/ 9380	11055/ 25610	6030/ 12060
9	Corona Extinction voltage (KV rms)	176	-	176	-

The Insulator string Hardware fittings and OPGW assemblies shall comply and conform to the above requirement.

BALL & SOCKET DIMENSIONS:- The Ball and Socket for Hardware fittings shall necessarily conform to the dimensions as stipulated in the Indian Standards. The Ball and Socket dimensions of the Hardware sets to be used with 7000 kg and 9100 kg Electro Mechanical strength Disc Insulators shall conform to designation 16mm/16mm-B in accordance with IS:2486(Part-II) or equivalent International Standard. The Ball and Socket dimension of Hardware to be used with 16,500 kg Electro Mechanical strength disc insulator shall conform to designation 20mm in accordance with IS-2486:(Part-II) or equivalent International Standard. The Bidder shall offer full detail of locking device in accordance with IS 2486:(Part-III) or equivalent International Standard along with test reports, gauges and adherence to Standards for Tests on Locking Devices in line with IS:2486 (Part-IV) or equivalent International Standard.

Packing and Marking

All insulators shall be packed in strong seasoned wooden crates. The gross weight of the crates along with the material shall not normally exceed 200 Kg to avoid handling problem.

Standards

The insulator strings and its components shall conform to the following Indian/ International Standards which shall mean latest revision, with amendments/ changes adopted and published, unless specifically stated otherwise in the Specification.

In the event of supply of insulators conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent to those specified. In case of award, salient features of comparison between the standards proposed by the Bidder and those specified in this document will be provided by the Supplier to establish equivalence.

Sl. No.	Indian Standard	Title	International Standard
1.	IS:209-1992	Specification for zinc	BS:3436
2.	IS:406-1991	Method of Chemical Analysis of Slab Zinc	BS:3436
3.	IS:731-1991	Porcelain insulators for overhead Power lines with a nominal voltage greater than 1000 V	BS:137- (I&II) IEC:60383
4.	IS:2071 Part (I) – 1993 (Part(II)- 1991 Part(III)- 1991	Methods of High Voltage Testing	IEC:60060-1
5.	IS:2486 Part- I-1993 Part- II-1989 Part-III-1991	Specification for Insulator fittings for Overhead Power Lines with a nominal voltage greater than 1000V General Requirements and Tests Dimensional Requirements Locking Devices	BS:3288 IEC:60120 IEC:60372
6.	IS:2629-1990	Recommended Practice for Hot, Dip Galvanisation for iron and steel	ISO-1461 (E)
7.	IS:2633-1992	Testing of Uniformity of Coating of zinc coated articles	

8.	IS:3188-1988	Dimensions for Disc Insulators	IEC:60305
9.	IS:6745-1990	Determination of Weight of Zinc Coating on Zinc coated iron and steel articles	BS:433-1969 ISO:1460-1973
10.	IS:8263-1990	Methods of RI Test of HV insulators	IEC:60437 NEMA Publication No.07/1964/ CISPR
11.	IS:8269-1990	Methods for Switching Impulse test on HV insulators	IEC:60506
12.		Thermal Mechanical Performance test and mechanical performance test on string insulator units	IEC: 60575
13.		Salt Fog Pollution Voltage Withstand Test	IEC:60507
14.		Residual Strength of String Insulator Units of Glass or Ceramic Material for Overhead Lines after Mechanical Damage of the Dielectric	IEC:60797
15.		Guide for the selection of insulators in respect of polluted conditions	IEC:60815
16.		Tests on insulators of Ceramic material or glass or glass for overhead lines with a nominal voltage greater than 1000V	IEC:60383
17.		Characteristics of string insulator units of the long rod type	IEC : 60433
18.		Standard Test Method for Autoclave Expansion of Portland Cement	ASTM C151-93-a
19.		American National Standard for Insulators wet process porcelain and toughened glass suspension type	ANSI C29-2-1992

4 (A) Standard Guaranteed Technical Particulars of Hardware Fittings and Accessories for Conductor are furnished below:

4(A).1 SINGLE SUSPENSION HARDWARE FOR PANTHER, ZEBRA ACSR CONDUCTOR WITH PREFORMED ARMOUR RODS

S.No.	ITEM	PANTHER	ZEBRA
1.	Type of clamp	AGS type	AGS type
2.	Ball & socket dimension	16mm	16mm
3.	Suitable for conductor size	ACSR Panther with amour rods	ACSR Zebra with amour rods
4.	Breaking strength	7000 kg.	7000 kg.
5.	Tension clamp & keeper	Alu.alloy GDC	Alu.alloy GDC
6.	Anchor. Shackle. Ball Link & socket Eye	Forged steel HDG	Forged steel HDG
7.	Bolts, nuts & washers	Galvanised MS	Galvanised MS
8.	Security clip	R type made of SS/PB	R type made of SS/PB
9.	Spring Washer	Electro galvanised spring steel	Electro galvanised spring steel

10.	Galvanising standard	IS:2633	IS:2633
11.	Standard reference	2486 part-I,II & III	2486 part-I,II & III
12.	Arcing Horn	MS Flat 25x6	Steel tube type
13.	Preformed Armour rods	As per standard in No. & size.	As per standard in No. & size.

The 132 / 220 KV double suspension hardware set suitable for Panther / Zebra conductor shall consist of following items:-

S.No	ITEM	Qty / Set	Material
1	Ball Hook	1	Forged Steel
2	Socket Clevis	3	Forged Steel
3	Yoke Plate	2	Mild Steel
4	Ball Clevis	2	Forged Steel
5	Arcing Horn	1	M.S. Flat / Steel tube
6	Clevis eye	1	Forged Steel
7	Suspension clamp AGS type	1	Aluminium Alloy
8	Pre formed armour rod	1 Set	Aluminium Alloy

AT TENSION LOCATIONS : 14 disc single tension string with 160 KN E&MS disc insulators will be used with compression type dead end clamp.

4(A)2 SINGLE TENSION HARDWARE COMPRESSION TYPE SUITABLE FOR ZEBRA:-

Single tension string Hardware shall comprise of one 'D' Shackle, one Ball Link, one Forged Steel Socket, Socket Clevis Horn holder, one line side Arcing Horn and one Tension Clamp of compression type having before and after compression dimensions strictly as mentioned below:-

S.NO	ITEM	ZEBRA
1.	Type of clamp	Compression type
2.	Suitable for conductor size	ACSR Zebra
3.	Breaking strength	16500 kg.
4.	Tension clamp jumper	Ex-Alu.alloy
5.	Steel sleeve, anchor shackle, ball link socket eye	Forged steel HDG
6.	Bolts, nuts and washers	Galvanised MS
7.	Security clip	'R' type made of SS/PB
8.	Spring washer	Electro galvanised spring wheel
9.	Galvanised Standard	IS:2633
10.	Standard reference	2486, part – I,II & III
11.	Arcing Horn	Steel tube type
12.	Standard Length of hardware set without pin and D shackle arrangement	539 mm
13.	Diameter of aluminium tube before compression: a) Inner dimension b) Outer dimension	31mm 48 mm
14.	Diameter of aluminium tube after compression:- a) Across Flat	40 mm

	b) Across Corner	46 mm
15.	Diameter of steel tube before compression:- a) Inner dimension b) Outer dimension	9.95 mm 20.8 mm
16.	Diameter of steel tube after compression. a) Across Flat b) Across Corner	17.5 mm 20.2 mm
17.	Length of sleeve (Steel/Al.) a) Before compression b) After compression	241/711 2/763
18.	Conductivity	Equal to ACSR Zebra
19.	Weight of hardware	As per ISS

In the case of railway / road / river / other transmission line crossing, double suspension / double tension insulators strings will be used with their hardwares and fittings.

4(A) .3 DOUBLE TENSION HARDWARE FOR ZEBRA ACSR CONDUCTOR COMPRESSION TYPE:-

BALL & SOCKET dimensions:- The ball and socket dimensions of double tension hardware for Panther ACSR Conductor which will be used with 90KN disc insulator & for Zebra ACSR Conductor with 160 KN disc insulator shall conform to dimension 16mm B& 20 mm B.

The double tension string of 132 KV and 220 KV line shall have ultimate breaking strength of not less than 9100 kg and 16500 kg respectively. Individual items of the fittings which will be subjected to tension shall also have ultimate breaking strength of not less than 9100 kg and 16500 kg. The compression clamp shall have a minimum slipping strength of not less than 95% of breaking strength of conductor with which it is used.

CONDUCTIVITY:- The entire fitting or part thereof shall have the conductivity equivalent to length of conductor.

All the ferrous parts should be hot dip galvanised as per IS 2633 and nut bolt should be galvanised as per IS 5358.

220 KV DOUBLE TENSION HARDWARE for ACSR Panther and Zebra shall comprise of following items:-

S.No	ITEM	Qty / Set	Material
1	“U” clevis	2	Forged Steel
2	Chain Link	1	Forged Steel
3	Yoke Plate	2	M.S. Plate
4	Ball Clevis	2	Forged Steel
5	Socket Clevis	2	Forged Steel
6	Clevis eye	1	Forged Steel
7	Arcing Horn	1	M.S. Flat / Steel tube
8	Compression tension clamp assembly complete	1	Extruded Al. & Forged Steel.

4(A) .4 CONDUCTOR ACCESSORIES:

(A) Armour Grip Suspension Clamp (AGS):

AGS fitting shall consist of 2 Neoprene Halves, a set of Helical rods made of Aluminium alloy, two Aluminium halves casting having inner profile matching with the profile of the Armour rod cage and jointed by supporting strap made of Aluminium alloy.

The Bidder should give complete data on the reduction of the dynamic stresses of the Conductor at the point of AGS support compared to that of bare clamp used with preformed types of Armour rods.

The Bidder will be required to prove the comparative performance in regard to the dynamic flexural stress pattern on the vibrating Conductor on the tensioned span with actual tests on the AGS unit compared to the normal bare clamp with Armour rods. Suitable curves should be furnished along with the bid for the same and also actual reports on the stress/ strain determinations. The Bidder should give the guaranteed value of the power loss of the AGS units offered by them supported by a test certificate of any reputed laboratory of the country. Suitable curves should be furnished along with the bid for the power loss due to AGS unit as well as with the conventional envelope type of Suspension Clamps.

The housing supports and housing straps should provide positive stop closure. AGS unit should have low rotational inertia, strut action of the Armour Cage, resilient cushioning of the neoprene insert, immunity from high compressive and flexural stress and wide area support. Manufacturer is required to guarantee minimum fatigue life of the AGS units and this would be established under actual tests on tensioned Conductor span. The manufacturer

is required to guarantee minimum 40 years life of the complete AGS units including Neoprene cushioning and this should be established under actual test on a tensioned Conductor span.

The rubber used with AGS unit must be capable of withstanding desired long out-door performance including the variation of temperature from 0⁰C to 75⁰C. The Bidder will have to provide certificate from reputed manufacturers that the rubber being supplied by them is suitable for AGS fitting and must have tensile strength of 2000 PSI and minimum ultimate elongation 300%.

The helical retaining rods required for AGS assembly shall be made of Aluminium alloy of HE 20 grade as per IS-6051/19 or equivalent International Standard duly heat treated and shall be suitable to wrap a desired size of Conductor. The tensile strength of the retaining rod material should not be less than 50,000 PSI and the electrical conductivity should not be less than 40% (IACS). The minimum slipping strength of the complete fitting shall not be less than 15% and more than 20% of the UTS of the cable on which it is to be used. The Clamp shall be in 2 parts made of Aluminium and will have inner profile matching with the profile of Armour rod. This Clamp should be made by drop forging process. AGS assembly should be provided with the forged steel socket eye to match with the suspension string and should have UTS not less than 7,000 Kgs.

IT IS ESSENTIAL FOR THE BIDDER TO HAVE SUITABLE HEAT TREATMENT FACILITIES FOR ALUMINIUM ALLOY WIRES IN THE ARMOUR GRIP SUSPENSION UNITS. FORMED ROD BASED ITEMS WILL NOT BE ACCEPTABLE FROM MANUFACTURERS WHO DO NOT HAVE NECESSARY TECHNOLOGY FOR DEVELOPMENT OF ADEQUATE RESILIENCE, ELONGATION UTS AND TWIST TEST FACILITIES BACKED WITH PROPER HEAT TREATMENT SYSTEMS. SUCH OFFERS MAY BE TREATED AS NON-RESPONSIVE.

(B) The AGS Preformed Armour rods set suitable for ACSR Zebra/Panther conductor(as the case may be) shall be used to minimize the stress developed in a conductor due to different static and dynamic loads because of vibration due to wind, slipping of conductor from suspension clamp as a result of unbalance conductor tension in adjacent span and broken wire condition. It shall be made of Aluminium alloy of HE 20 grade as per IS-6051/19 duly heat-treated. The aluminium alloy wires (pre heat treated) for manufacturing of Armour rods can also be used, however bidder should submit the test certificates in support of their claim for using pre heat-treated wires. It shall also withstand power arcs; chafing and abrasion from suspension clamp and localized heating effects due to resistance losses of the conductor.

The pitch length of the rods shall be determined by the supplier but shall be less than that of the outer layer of ACSR conductor and the same shall be accurately controlled to maintain uniformity and consistently reproducible characteristics wholly independent of the skill of lineman.

The preformed armour rod sets shall have right hand lay and the inside diameter of the helices shall be less than the outside diameter of the conductor to grip the same tightly. The surface of the armour rod when fitted on the conductor shall be smooth and free from projections, cuts and abrasions etc.

The length of each rod shall be as per drawing enclosed. The tolerance in length of each rod shall be +/- 25mm. The tolerance in length of the rods in completed sets should be within 13 mm between the longest and shortest rod. The ends of the armour rod shall be parrot billed.

The number of armour rods in each set shall be 11/12. The each rod shall be marked in the middle with paint for easy applications on the line.

The armour rod shall not loose their resilience even after five applications. The conductivity of each rod of the set shall not be less than 40% of the conductivity of International Annealed Copper Standard (IACS). The minimum tensile strength of armour rod should be 35 Kg per sq.mm.

Mid span joints, Repair Sleeves, Flexible Copper Bond etc. should be used as per transmission line practice & latest revision of I.S.S.

(B) STANDARD PARTICULARS FOR MID SPAN JOINTS:-

S.No	Description	Panther ACSR	Zebra ACSR	Earthwire
1	Type of hardware	Compression	Compression	Compression
2	Breaking strength	100% of UTS of conductor	100% of UTS of conductor	100% of UTS of earthwire
3	Conductivity	Equal to ACSR Panther	Equal to ACSR zebra	Equal to earthwire
4	Dimensions before & after compression			
	Aluminium Joint :-			
	a) Overall Dia before compression	23	31	-
	(i) Inner dimension	38	48	-
	(ii) Outer dimension			
	b) Dimension after compression:-	32	40	
	(i) Across Flat	37	46	
	(ii) Across corner			
	Steel Joint :-			
	a) Overall Dia before compression			
	(i) Inner dimension	9.35	9.95	11.5
	(ii) Outer dimension	18	20.8	21
	b) Dimension after compression:-			
	(i) Across Flat	15.1	17.5	17.5
	(ii) Across corner	17.4	20.2	20.2
5	The material from which following is made of			
	Al. Sleeve	Extruded 99.5% pure Aluminium	Extruded 99.5% pure Aluminium	-
	Steel Sleeve	HDG Steel	HDG Steel	HDG Steel
6	Standard weight	As per IS with tolerance	As per IS with tolerance	As per IS with tolerance

7	Length of aluminium sleeves before and after compression m.m. Length of steel sleeves before and after compression m.m.	610 / 660 mm 203 / 233 mm	711 / 775 mm 241 / 280	-
8	Reference	IS 2121	IS 2121	-

(D) STANDARD PARTICULARS OF REPAIR SLEEVES OF PANTHER ZEBRA AND EARTHWIRE

S.No	Description	Zebra ACSR	Earthwire
1	Breaking strength of cable with sleeve compressed	100% of UTS	100% of UTS
2	Conductivity of cable with sleeve compressed	Equal to conductor	Equal to earthwire
3	Dimensions before and after compression (flat to flat).	48 / 40 mm	20.8 / 17.5 mm
4	Length of sleeve before & after compression	279/310	254/280
5	The material from which sleeve is made	Extruded Aluminium	HDG Steel
6	Weight of repair sleeve	0.60 kg	

(E) VIBRATION DAMPER FOR PANTHER, ZEBRA & EARTHWIRE :-

Vibration dampers (4-R type) shall be used for Conductors & Groundwires.

S.No	Item	Zebra	Earthwire
1	Type	4 – R type	4 – R type
2	Suitable for conductor size	28.62 mm	10.98 mm
3	Material used for clamp	Alu. Alloy GDC as per IS 617	Alu. Alloy GDC as per IS 617
4	Messenger table	High tensile steel stranded galvanised wire	High tensile steel stranded galvanised wire
5	Damper weights	5.0 kg	1.8 kg.
6	Slipping strength	500 Kg	500 Kg
7	Natural frequency of damper	9.2, 15.8, 26.6, 36.8 Hz.	14.3, 20.4, 27, 33.9, 42.6 Hz.
8	No. Of clamps required per span length of 250M, 300M, 350M, 400M, 300 M & 500 M	Upto 400 M, 2 dampers per span; and upto 500 M, 4 dampers per span	Upto 400 M, 2 dampers per span; and upto 500 M, 4 dampers per span

9	Minimum fatigue strength of damper in cycle	10 million cycle	10 million cycle
10	Amplitude of fatigue test at the highest resonant frequency	+ 1 m.m.	+ 1 m.m.
11	Slip strength of clamp	500 kg	250 kg
12	Clamping torque	8 kg-mtr	4 kg-mtr
13	Maximum dynamic strain on the conductor with the damper at clamping points	Less than 150 micro strains	Less than 150 micro strains
14	Standard to which material will be manufactured and tested	IS 98 / 1980	IS 98 / 1980
15	Magnetic power loss in watts	Below 1 watt per damper	Below 1 watt per damper

MISCELLANEOUS ITEMS: Enamelled number plates, phase plates and danger board, bolts and nuts, spring washers, pack washers and other tower accessories like 'D' shackle, hanger and fasteners shall be provided with the tower gantry. Drawing of Anti-climbing devices (including barbed wire) for Gantry shall be submitted by contractor for approval of CSPTCL. No extra payment will be made for this.

5 Testing Expenses

5.1 All testing shall be arranged by the contractor **at no extra cost to the Owner**. No payment shall be made by the CSPTCL in the account of testing for the type test, acceptance test, routine test, etc. to the contractor.

5.2 For type tests which involve the tests on the complete insulator string with hardware fittings, the Contractor of hardware fittings shall supply the necessary number of sets of hardware fittings at the place of testing free of cost.

5.3 In case of failure in any type test, the Bidder whose material has failed is either required to modify the design of the material & successfully carryout all the type tests as has been detailed out in Clause 5.1 of this specification or to repeat that particular type test at least three times successfully at his own expenses. In case of failure of the complete string in any type test, the manufacturer whose product has failed in the test shall get the test repeated at his cost.

5.4 The entire cost of testing for type test, acceptance and routine tests and tests during manufacture specified herein shall be treated as included in the quoted Price.

5.5 In case of failure in any type test, repeat type tests are required to be conducted, then, all the expenses for deputation of Owner's representative/ Inspector deputation or ₹ 5000.00 whichever is higher shall be deducted from the contract price. Also if on receipt of the Contractor's notice of testing, the Owner's representative/Inspector does not find material to be ready for testing the expenses incurred by the Owner for deputation or ₹ 5000.00 whichever is higher shall be deducted from contract price.

6 Sample Batch For Type Testing

6.1 The Contractor shall offer material for sample selection for type testing only after getting Quality Assurance Programme approved by the Owner. The Contractor shall offer at least three times the quantity of materials required for conducting all the type tests for sample selection. The sample for type testing will be manufactured strictly in accordance with the Quality Assurance Programme approved by the Owner.

6.2 Before sample selection for type testing the Contractor shall be required to conduct all the acceptance tests successfully in presence of Owner's representative.

7 Inspection

- 7.1 The Owner's representative shall at all times be entitled to have access to the works and all places of manufacture, where the material and/or its component parts shall be manufactured and the representatives shall have full facilities for unrestricted inspection of the Contractor's, sub-Contractor's works raw materials, manufacturer's of all the material and for conducting necessary tests as detailed herein.
- 7.2 The material for final inspection shall be offered by the Contractor only under packed condition as detailed in clause 5.8 of this part of the Specification. The engineer shall select samples at random from the packed lot for carrying out acceptance tests.
- 7.3 The Contractor shall keep the Owner informed in advance of the time of starting and of the progress of manufacture of material in its various stages so that arrangements could be made for inspection.
- 7.4 The acceptance of any quantity of material shall in no way relieve the Contractor of his responsibility for meeting all the requirements of the Specification, and shall not prevent subsequent rejection, if such material are later found to be defective.

8 Packing and Marking

8.1 All material shall be packed in strong and weather resistant wooden cases/crates. The gross weight of the packing shall not normally exceed 200 Kg to avoid handling problems.

- 8.2 The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.
- 8.3 Suitable cushioning, protective padding, dunnage or spacers shall be provided to prevent damage or deformation during transit and handling.
- 8.4 Bolts, nuts, washers, cotter pins, security clips and split pins etc. shall be packed duly installed and assembled with the respective parts and suitable measures shall be used to prevent their loss.
- 8.5 Each component part shall be legibly and indelibly marked with trade mark of the manufacturer.
- 8.6 All the packing cases shall be marked legibly and correctly so as to ensure safe arrival at their destination and to avoid the possibility of goods being lost or wrongly despatched on account of faulty packing and faulty or illegible markings. Each wooden case/crate shall have all the markings stenciled on it in indelible ink.

9 Standards

- 9.1 The Hardware fittings; conductor and earth wire accessories shall conform to the following Indian/International Standards which shall mean latest revisions, with amendments/ changes adopted and published, unless specifically stated otherwise in the Specification.
- 9.2 In the event of the supply of hardware fittings; conductor and earth wire accessories conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent to those specified. In case of award, salient features of comparison between the Standards proposed by the Contractor and those specified in this document will be provided by the Contractor to establish their equivalence.

Sl.	Indian Standard	Title	International Standard
1.	IS: 209-1992	Specification for zinc	BS:3436-1986
2.	IS:398-1992 Part-V	Aluminum Conductor Galvanized Steel- Reinforced For Extra High Voltage (400 KV) and above	IEC:1089-1991 BS:215-1970
3.	IS 1573	Electroplated Coating of Zinc on iron and Steel	
4.	IS : 2121 (Part-II)	Specification for Conductor and Earthwire Accessories for Overhead Power lines: Mid-span Joints and Repair Sleeves for Conductors	
5.	IS:2486 (Part-I)	Specification for Insulator Fittings for Overhead power Lines with Nominal Voltage greater than 1000 V: General Requirements and Tests	
6.	IS:2629	Recommended Practice for Hot Dip Galvanising of Iron and Steel	
7.	IS:2633	Method of Testing Uniformity of Coating on Zinc Coated Articles	
8.		Ozone test on Elastomer	ASTM- D1 171
9.		Tests on insulators of Ceramic material or glass for overhead	IEC:383-1993

Sl.	Indian Standard	Title	International Standard
		lines with a nominal voltage greater than 1000V	
10.	IS:4826	Galvanized Coating on Round Steel Wires	ASTM A472-729 BS:443-1969
11.	IS:6745	Methods of Determination of Weight of Zinc Coating of Zinc Coated Iron and Steel Articles	BS:433 ISO : 1460 (E)
12.	IS:8263	Method of Radio Interference Tests on High Voltage Insulators	IEC:437 NEMA:107 CISPR
13.	IS:6639	Hexagonal Bolts for Steel Structures	ISO/R-272
14.	IS:9708	Specification for Stock Bridge Vibration Dampers for Overhead Power Lines	
15.	IS:10162	Specification for Spacers Dampers for Twin Horizontal Bundle Conductors	

SECTION IV-B (iv)
// VENDOR LIST //

As per approved vendor list appended in CSPTCL website:-

- i) The name of the vendors shall be as per the list displayed in CSPTCL's website www.cspc.co.in on date of issue of NIT
- ii) Other equipments/materials which are required but not covered in the above vendor list reputed make with prior approval of CSPTCL.
- iii) Other vendors who possess requisite manufacturing capability (wherever required), type test certificate and performance certificate as per criteria of CSPTCL may also be considered with specific approval of CSPTCL.
- iv) However, CSPTCL reserves right to add, delete, revise and specify any vendor subsequently and CSPTCL;s decision shall be final.

Date :

Signature :

Name :

Designation :

SECTION -IV-C

TECHNICAL CONDITIONS FOR ERECTION, TESTING AND COMMISSIONING (SURVEY AND SOIL INVESTIGATION, STUB SETTING, ERECTION OF TOWER, STRINGING ETC.)

This section cover technical condition and standards for installation, construction of 220 KV transmission line including Check survey, detailed survey, tower spotting, foundation, erection, stringing, testing and commissioning of line.

General requirement:-As per IS 5613 (Part 3/ Sec. 2): 1989 and as per tender specification.

SURVEY

1.0 SCOPE OF WORK:-

General Information & scope of work :-

- A. The technical specifications covers detailed survey, check survey, including route alignment, profiling, tower spotting, optimization of locations, check survey, contouring, and soil investigation for the transmission lines / part of the transmission lines covered under this specification.
- B Preparation of Survey reports including estimation of Bill of Quantities, identification and explanation of route constraints (like Forest, Animal/Bird sanctuary, reserve coal belt areas, oil pipe line/underground inflammable pipe lines etc.), infrastructure details available en-route etc.**
- B The Provisional quantities for the scope of work are indicated in relevant Price Schedules. The actual quantities to be executed shall be decided by CSPTCL during execution stage and the final quantities shall be as approved by CSPTCL.
- C The Contractor must note that the CSPTCL shall not be responsible for loss or damage to properties, trees etc. due to contractor's work during survey. The Contractor shall indemnify the Owner for any loss or damage to properties, trees etc. during the survey work.
- D The Contractor shall also engage services of a reputed consultant or experts from independent educational/research institutions for examining stability aspects of the selected transmission line route/locations in hilly terrain wherever required.

1.A General

- 1.A.1. The technical specifications covers detailed survey, check survey, including route alignment, profiling, tower spotting, optimization of locations, check survey, contouring, and soil investigation for the transmission lines / part of the transmission lines covered under this specification.

1.1 Requirement of Transmission Line

- 1.1.1. The alignment of the transmission line shall be most economical from the point of view of construction and maintenance. The contractor shall identify & examine alternative route alignments and suggest to the Owner the optimal route alignment.
- 1.1.2. Routing/Re-routing of transmission line through protected/reserved forest area should be avoided. In case it is not possible to avoid the forests or areas having large trees completely, then keeping in view of the overall economy, the route should be aligned in such a way that cutting of trees is minimum.
- 1.1.3. The route should have minimum crossings of Major River, Railway lines, National/State highways, overhead EHV power line and communication lines.
- 1.1.4. The number of angle points shall be kept to minimum.
- 1.1.5. Marshy and low lying areas, river beds and earth slip zones shall be avoided to minimize risk to the foundations.
- 1.1.6. It would be preferable to utilize level ground for the alignment.
- 1.1.7. Crossing of power lines shall be minimum. Crossing of communication line shall be minimized and it shall be preferably at right angle. Proximity and parallelism with telecom lines shall be eliminated to avoid danger of induction to them.

- 1.1.8. Areas subjected to flooding such as nalah shall be avoided.
- 1.1.9. Restricted areas such as civil and military airfield shall be avoided. Care shall also be taken to avoid aircraft landing approaches.
- 1.1.10. All alignment should be easily accessible both in dry and rainy seasons to enable maintenance throughout the year.
- 1.1.11. Certain areas such as quarry sites, and rich plantations, gardens & nurseries should be avoided.
- 1.1.12. The line routing should avoid large habitations, densely populated areas, Forest, Animal/Bird sanctuary, reserve coal belt areas, oil pipe line/underground inflammable pipe lines etc. to the extent possible.
- 1.1.13. The areas requiring special foundations and those prone to flooding should be avoided.
- 1.2 The contractor shall submit his preliminary observations & suggestions along with various information/data /details collected and marked with the alternative routes etc. The final evaluation of the alternative routes shall be conducted by the contractor in consultation with Owner's representatives and optimal route alignment shall be proposed by the contractor. if required. Site visit and field verification shall be conducted by the contractor jointly with the Owner's representative for the proposed route alignment.

1.3 SURVEY & ROUTE OF THE TRANSMISSION LINE:-

- (i) Walk over Survey:- Before starting the detailed survey a walk-over survey of the line shall be made . The various feasible routes shall be ascertained and marked on the topo sheet.
- (ii) Three alternate tentative route alignment of the proposed **220 KV LINES** shall be submitted by bidder. The preliminary survey of the line should be made and plotted on the latest 1: 50000 topo sheet of survey of India map, using the shortest route technically feasible. In respect of forest involvement two or more alternate routes should be submitted for approval. These alternate routes are to be fixed in consultation with the Forest Authorities and the concerned Engineer-in-charge of CSPTCL. The route is subjected to modification / alterations depending on exigencies during the currency of the contract. The contractor will carry out the survey work, prepare the profile, mark the towers and will submit the profile to the O.I.C. of the works for approval from the CE (Transmission).
- (iii) At the starting point of the commencement of route survey an angle iron spike of 65x65x6mm section and 1000mm long shall be driven firmly into the ground to project only 150mm above the ground level. A punch mark on the top section of the angle iron shall be made to indicate location of the survey instrument. Teak wood peg 50x50x650mm six shall be driven at prominent position at intervals of not more than 750 metre along the transmission line to be surveyed up to the next angle point. Nails of 100mm wire length should be fixed on the top of these pegs to show the location of instrument. The pegs shall be driven firmly into the ground to project 100mm only above ground level. At angle position stone/concrete pillar with CSPTCL marked on them shall be put firmly on the ground for easy identification.
- (iv) Soil resistivity along the route alignment, shall be measured in dry weather by four electrode method keeping inter-electrode spacing of 50 meters. For calculating soil resistivity following formula shall be use:-

$$P = \frac{2}{\pi} a R$$

where a=50 meters
R= Earth resistivitymeasure in Ohms
P=Soil resistivity in Ohm-mtr

Measurement shall be made at every 2.5 Kms. along the route of transmission lines. In case soil characteristic, changes within 2.5 kms., the value shall also to be measured at intermediate locations. The megger reading and soil characteristics shall also be indicated in the soil resistivity results.

The soil resistivity values shall be submitted duly marked on the route map and also in the form of statement. The quoted rates for detailed survey/ check survey work shall be inclusive of cost of measuring soil resistivity values along the proposed route and the contractor will not be paid separately for this work.

- (v) All topographical details, permanent features, such as trees, building etc. **23 mtr for 400KV** on either side of the alignment shall be detailed on the profile plan.

All topographical details, permanent features, such as trees, building etc. **xx mtr for 220KV** on either side of the alignment shall be detailed on the profile plan.

The contractor shall be responsible for correct setting of stubs. Discrepancies, if any, shall be brought to the notice of Board and final approval shall be taken before execution of work. The requirement of tower site levelling and revetment work if required, will be marked by the contractor in the profiles while carrying out the survey work.

- (vii) If due to site conditions any change in the tower location/ provision of extension is considered necessary compared to approved profiles, the contractor shall bring the same to the knowledge of the Board well in time and get revised approval of the profile before setting the stubs of the work.

1.3.1 DETAIL SURVEY

Detailed survey shall be conducted on the approved alignment. In hilly region level of ground at a suitable distance below the outer conductor on either side from the central line is also be noted and marked in the profile, so as to ensure required ground clearance underneath condition and side clearances in swung condition of conductor. Application of detail survey shall be done as per IS 5613 (Part 3/ sec. 2):1989 and tender specification.

Final route alignment drawing with latest topographical and other details/features including all rivers, railway lines, canals, roads etc. of selected route alignment shall be submitted by the contractor for Owner's approval along with report containing other information/details as mentioned above.

- 1.3.2 The contractor shall be responsible for correct setting of stubs. Discrepancies, if any, shall be brought to the notice of Board and final approval shall be taken before execution of work. The requirement of tower site levelling and revetment work if required will be marked by the contractor in the profiles while carrying out the survey work.

If due to site conditions any change in the tower location/ provision of extension is considered necessary compared to approved profiles, the contractor shall bring the same to the knowledge of the CSPTCL well in time and get revised approval of the profile before setting the stubs of the work.

PROFILE PLOTTING AND TOWER SPOTTING:-

The Survey is to be conducted by the bidder and the profiles will be handed over to C.S.P.T.C.L. progressively marking of towers on the profiles. The profile will be prepared on cm. Graph paper on scale 1: 2000 horizontal and 1:200 vertical on 1.0, 10mm squared paper as per approved procedure. Reference levels at every 20 metres along the profile are also to be indicated on the profile besides, R/Ls at undulations. Areas along the profile sheet, in the view of the contractor, are not suitable for tower spotting, shall also be clearly marked on the profile plots. If the difference in levels be too high, the chart may be broken up accordingly to requirement. A 10mm overlap shall be shown on each following sheet. The chart shall progress from left to right. Sheet shall be 594mm wide in accordance with the IS standard. For 'as built' profile these shall be in A1 size. The profile should be submitted to OIC of the work along with the tower schedule indicating the minimum and maximum weight spans.

Application of tower spotting shall be done as per IS 5613 (Part 3/ sec. 2):1989 Annexure –B.

The contractor will be responsible for the correct setting of tower as shown in approved profiles. If tower after erection are found to be out of the approved alignment / position in the profile, the contractor will dismantle and re erect them correctly fully at his own cost and without extension of time.

Tolerance in over head line construction as per IS 5613 (Part 3/ sec. 2):1989 Annexure –C.

The following tolerance shall be applicable in case of position of foundation erected with reference to the tower position spotting on survey chart:-

Type of Tower	Out of alignment	From centre line of Route	From transverse centre line
Suspension or intermediate	0.5 degree	25 mm	± 250mm
Section or Tension (set at bi-section of diversion angle)	0.5 degree	25 mm	± 25mm

TOWER LOCATION:-**SAG TEMPLATE AND TOWER SPOTTING DATA :-**

Sag template curve drawing and Tower Spotting Data shall be supplied by the Contractor. Sag template prepared based on the sag template curve drawing shall only be used for tower spotting on the profiles. Two numbers of the approved template, prepared on rigid transparent plastic sheet, shall be provided by the Contractor to the Owner for the purpose of checking the tower spotting. The templates shall be on the same scale as that of the profile. Sag template shall be made as per IS 5613 (Part 3/ sec. 2):1989 Annexure-B.

TOWER SPOTTING :-

As per sag template and tower spotting data, tower locations shall be marked on the profiles. While spotting the towers on the profile sheet, the following shall be borne in mind:-

- (a) **SPAN:-** The number of consecutive spans between the section points shall not exceed 15 spans or 5 Kms. In plain terrain and 10 spans or 3 kms in hilly terrain.
- (b) **EXTENSION:-** An individual span shall be as near to the normal design span as possible. In case an individual span becomes too short with normal supports on account of undulations in ground profile, one or both the supports of the span may be extended by inserting standard body extension designed for the purpose according to technical specification. In case of locations where the ground clearance is available, truncated towers may be spotted. The provisions kept in the design of towers w.r.t. body/leg extns , truncations shall be intimated by the contractor to the Owner during execution.
- (c) **LOADING:-** The towers shall be spotted such that wind & weight spans are within permissible limits (as per tower spotting data), to avoid any loading on towers beyond design provisions. **In case at certain locations where actual spotting spans exceed the design spans and cross-arms and certain members of towers are required to be modified / reinforced , in that case drawings for the modified/reinforced towers will be supplied by the Contractor .**
- (d) **CLEARANCES :-** The minimum ground clearance of 8.84 metres shall be available corresponding to the maximum working temperature and normal span of 400 metres or as per IS:5613. The clearance from building, trees, power line crossings should be made in accordance with the Indian Electricity Rules, 1956 as amended up-to-date and as per IS:5613.
- d) Road Crossing**
At all important road crossings, the tower shall be fitted with tension insulator strings but the ground clearance at the roads under maximum temperature and in still air shall be such that even with conductor broken in adjacent span, ground clearance of the conductor from the road surfaces will not be less than specified. At all national highways crossing span will not be more than 250 meters.
- e) Railway Crossings**
All the railway crossings coming-enroute the transmission line shall be identified by the Contractor. At the time of detailed survey, the railway crossings shall be finalized as per the regulation laid down by the Railway Authorities. The following are the important features of the prevailing regulations (revised in 1987)
 - i) The crossings shall be supported on large angle & dead end type tower on either side depending on the merits of each case.
The crossing shall normally be at right angle to the railway track.
The minimum distance of the crossing tower shall be at least equal to the height of the tower plus 6 meters away measured from the centre of the nearest railway track.
No crossing shall be located over a booster transformer, traction switching station, traction sub-station or a track cabin location in an electrified area.

Minimum ground clearance above rail level of the lowest portion of any conductor under condition of maximum sag shall be maintained at 17.90 m 400 KV transmission lines.

The crossing span will be limited to 300 meters.

f) River Crossings

In case of major river crossing, towers shall be of suspension type along with anchor towers of large angle & dead end type tower on either side of the main river crossing. Alternately on the basis of economics and / or site/ execution constraints crossing of rivers using extended angle towers also shall be considered. For navigable rivers, clearance required by navigation authority shall be provided. For non navigable river, clearance shall be reckoned with respect to highest flood level (HFL).

g) Power line Crossings

Where the line is to cross over another line of the same voltage or lower voltage, tower with suitable extensions shall be used. Provisions to prevent the possibility of its coming into contact with other overhead lines shall be made in accordance with the Indian Electricity Rules, 1956 as amended up-to-date. In order to reduce the height of the crossing towers, it may be advantageous to remove the ground-wire of the line to be crossed (if this is possible, and permitted by the Owner of the line to be crossed).

Minimum clearance in metres between lines when crossing each other:

Nominal Voltage	System	132 KV	220 KV	400 KV	765 KV
400 KV		5.49	5.49	5.49	7.94
220 KV		4.58	5.49	5.49	7.94

h) Telecommunication Line Crossings

The angle of crossing shall be as near to 90 degree possible. However, deviation to the extent of 30 degree may be permitted under exceptionally difficult situations.

When the angle of crossing has to be below 60 degree, the matter will be referred to the authority in charge of the telecommunication System. On a request from the Contractor, the permission of the telecommunication authority may be obtained by the Owner.

Also, in the crossing span, power line support will be as near the telecommunication line as possible, to obtain increased vertical clearance between the wires.

1.5 Clearance from Ground, Building, Trees etc.

Clearance from ground, buildings, trees and telephone lines shall be provided in conformity with the Indian Electricity Rules, 1956 as amended upto date.

The Contractor shall count, mark and put proper numbers with suitable quality of paint at his own cost on all the trees that are to be cut by the Owner at the time of actual execution of the work as detailed below. Contractor may please note that Owner shall not pay any compensation for any loss or damage to the properties due to Contractor's work.

1.5.A To evaluate and tabulate the trees and bushes coming within 23 m for 400 KV lines on either side of the central line alignment the trees will be numbered and marked with quality paint serially . The trees list should contain the following:

- Girth (circumstances) measured at a height of 1 meter from ground level.
- Approximate height of the tree with an accuracy of +2 meters.
- Name of the type of the species/tree.
- Name of village, owner of tree, khasara no and other details as required by revenue authority.

1.5.B The Contractor shall also identify the forest/Revenue- forest areas involved duly authenticated by concerned authorities.

- A statement of forest areas with survey/compartments Nos.(all type of forest RF/PF/Acquired forest/Revenue forest/Private forest/Forest as per dictionary meaning of forest etc.)
- A statement of Revenue -forest areas with survey/compartments nos.
- Tree cutting details(Girth wise & specie wise)
- Marking of forest areas with category on topo sheets 1:2,50,000 showing complete line route, boundaries of various forest divisions and their areas involved.
- Village forest maps of affected line and affected forest area and marking of the same.

f) Forest division map showing line and affected forest area.

1.5.C The Contractor shall finalize the forest clearance proposal on the prescribed format duly completed in all respects for submission by the Owner to the Forest Department.

1.6 Preliminary Schedule

The profile sheets showing the locations of the towers together with preliminary schedules of quantities indicating tower types, wind & weight spans, angle of deviation, crossing & other details etc shall be submitted by the contractor for review & approval by Owner's site-in-charge.

1.7 CHECK SURVEY:-

- (a) After approval of profile from ED (Transmission), the check survey shall be conducted to locate and peg mark the tower positions on ground conforming to the approved profile and tower schedule. In the process, it is necessary to have the pit centres marked according to the excavation marking charts. The levels, up or down of each pit centre with respect to the centre of the tower location shall be noted and recorded for determining the amount of earthwork required to meet the approved design parameters.
- (b) Changes in the preliminary tower schedule after detailed survey, if required, shall be carried out by the Contractor and he shall thereafter submit a final tower schedule for the approval of Owner. The tower schedule shall show position of all towers, type of towers, span length, type of foundation for each towers and the deviation at all angles as set out with other details.
- (c) If due to site conditions any change in the tower location/ provision of extension is considered necessary compared to approved profiles, the contractor shall bring the same to the knowledge of the CSPTCL well in time and get revised approval of the profile before setting the stubs of the work.
- (d) The contractor will be responsible for the correct setting of tower as shown in approved profiles. If tower after erection are found to be out of the approved alignment / position in the profile, the contractor will dismantle and re erect them correctly fully at his own cost and without extension of time.
- (e) Shall be made as per IS 5613 (Part 3/ sec. 2):1989.

2.0 SOIL INVESTIGATION /GEOTECHNICAL INVESTIGATIONS:-

2.1 General

CSPTCL requires that a detailed Geotechnical investigation be carried out at tower locations as per requirement of CSPTCL to provide the designer with sufficiently accurate information, both general and specific, about the substrata profile and relevant soil and rock parameters at site on the basis of which the foundation of transmission line towers can be classified and designed rationally.

These specifications provide general guidelines for geotechnical investigation of normal soils. Cases of marshy locations and locations affected by salt water or saltpeter shall be treated as special locations and the corresponding description in these specifications shall apply. Any other information required for such locations shall be obtained by Contractor and furnished to CSPTCL.

2.2 Scope

The scope of work includes detail soil investigations and furnishing bore log data at various tower locations as per requirement of CSPTCL. The provisional quantities have been indicated in Bill of Quantities. However, during actual execution of work, the location shall be decided by the site engineer in charge, depending upon the soil strata and terrain. Based on the bore log data / soil parameter /soil investigation results, the Contractor/soil investigation agency shall submit the test result for the locations and the approval for soil classification shall be taken from CSPTCL. The decision of CSPTCL is full and final.

2.2.2 These specifications cover the technical requirements for a detailed soil investigation work shall include mobilization of all necessary tools and equipment, provision of necessary engineering supervision and technical personnel, skilled and unskilled labour, etc. as required to carry out the entire field investigation as well as laboratory tests, analysis and interpretation of data and results, preparation of detailed soil report including specific recommendations for the type of foundations.. **The aforementioned work shall be done or supervised by any independent educational/research institutions or any govt. department laboratory or any govt./board approved agency having work experience of least 5 years**

in geotechnical investigation work as per technical specification. The approval for the same shall be obtained from CSPTCL.

- 2.2.3 Contractor shall make his own arrangements to establish the co-ordinate system required to position boreholes, tests pits and other field test locations. Contractor shall arrange to collect the data regarding change of course of rivers, major natural streams and nalas, etc., encountered along the transmission line route from the best available sources and shall furnish complete hydrological details including maximum velocity discharge, highest flood level (H.F.L), scour depth etc. of the concerned rivers, major streams and nalas (canals).
- 2.2.4 The filed and laboratory data shall be recorded on the Performa recommended in relevant Indian Standards. Contractor shall submit to CSPTCL after the completion of each boreholes/test.
- 2.2.5 After reviewing Contractor's geotechnical investigation report, Owner will call for discussions, at Owner's site Office, in order to comment on the report in the presence of Contractor's Geotechnical Engineer. Any expenditure associated with the redrafting and finalizing the report, traveling etc. shall be deemed included in the rates quoted for the geotechnical investigations.
- 2.2.6 Contractor shall carry out all work expressed and implied in these specifications in accordance with requirements of the specification.
- 2.2.7 The contractor shall prepare and submit soil profile along the transmission line route indicating salient soil characteristics / features, water table etc based on detailed soil investigations and other details / information collected during detailed survey.
- 2.2.8 It is essential that equipment and instruments be properly calibrated at the commencement of the work. If the CSPTCL so desires. Contractor shall arrange for having the instruments tested at an approved laboratory at its cost and shall submit the test reports to the Owner. If the Owner desires to witness such tests, Contractor shall arrange for the same.

2.3 Field Investigation for Soils

Tentative numbers of detailed soil investigation to be done is given in PBS

2.3.A Boring

Boreholes are required for detailed soil investigations.

2.3.A.1 General Requirements

- a) Boreholes shall be made to obtain information about the subsoil profile, its nature and strength and to collect soil samples for strata identification and for conducting laboratory tests. The minimum diameter of the borehole shall be 150mm and boring shall be carried out in accordance with the provisions of IS:1892 and the present specification:
- b) All boreholes shall be 7mtr deep for normal soil conditions. The depth of boreholes at river crossings and special locations shall be 40m. If a strata is encountered where the Standard Penetration Test Records N values greater than 100, with characteristics of rock, the borehole shall be advanced by coring atleast 3 mtr further in normal locations and at least 7 mtr further for the case of river crossing locations with prior approval of the Owner. When the boreholes are to be termination in soil strata an additional Standard Penetration Test shall be carried out at the termination depth. No extra payment shall be made for carrying out Standard Penetration Tests.
- c) Casing pipe shall be used when collapse of a borehole wall is probable. The bottom of the casing pipe shall at all times be above the test of sampling level but not more than 15cm above the borehole bottom. In case of cohesion less soils, the advancement of the casing pipe shall be such that it does not disturb the soil to be tested or sampled. The casing shall preferably be advanced by slowly rotating the casing pipe and not by driving.
- d) In-situ tests shall be conducted and undisturbed samples shall be obtained in the boreholes at intervals specified hereafter. Representative disturbed samples shall be preserved for conducting various identification tests in the laboratory. Water table in the bore hole shall be carefully recorded and reported following IS:6935. No water or drilling mud shall be used while boring above ground water table. For cohesion less soil below water table, the water level in the borehole shall at all times be maintained slightly above the water table.

- e) The borehole shall be cleaned using suitable tools to the depth of testing or sampling, ensuring least or minimum disturbance of the soil at the bottom of the borehole. The process of jetting through an open tube sampler shall not be permitted. In cohesive soils, the borehole may be cleaned by using a bailer with a flap valve. Gentle circulation of drilling fluid shall be done when rotary mud circulation boring is adopted.
- f) On completion of the drilling, Contractor shall backfill all boreholes as directed by the Owner.

2.3.A.2 Auger Boring

Auger boring may be employed in soft to stiff cohesive soils above the water table. Augers shall be of helical or post hole type and the cuttings brought up by the auger shall be carefully examined in the field and the description of all strata shall be duly recorded in the field bore log as per IS:1498. No water shall be introduced from the top while conducting auger boring.

2.3.A.3 Shell and Auger Boring

Shell and auger boring may be used in all types of soil which are free from boulders. For cohesion less soil below ground water table, the water level in the borehole shall always be maintained at or above ground water level. The use of chisel bits shall be permitted in hard strata having SPT-N value greater than 100 Chisel bits may also be used to extend the bore hole through local obstructions such as old construction. Boulders rocky formations etc. The requirements in Clause 4.5.1.2 shall apply for this type of boring also.

Rotary method may be used in all types of soil below water table. In this method the boring is carried out by rotating the bit fixed at the lower end of the drill rod. Proper care shall be taken to maintain firm contact between the bit and the bottom of the borehole. Bentonite or drilling mud shall be used as drilling fluid to stabilize and protect the inside surface of the borehole. Use of percussion tools shall be permitted in hard clays and in dense sandy deposits.

2.3.B Standard Penetration Test (SPT)

- 2.3.B.1 This test shall be conducted in all types of soil deposits encountered within a borehole, to find the variation in the soil stratification by correlating with the number of blows required for unit penetration of a standard penetrometer. Structure sensitive engineering properties of cohesive soils and sifts such as strength and compressibility shall not be inferred based on SPT values.

- 2.3.B.2 The test shall be conducted at depths as follows:

Location	Depths (m)
Normal Soils	2.0, 3.0, 5.0, 7.0
River crossings and special Locations.	2.0, 3.0, 5.0, 7.0, 10.0 and thereafter at the rate of 3m intervals upto 40 m or refusal whichever occur earlier.

- 2.3.B.3 The spacing between the levels of standard penetration test and next undisturbed sampling shall not be less than 1.0m. Equipments, accessories and procedures for conducting the test and for the collection of the disturbed soil samples shall conform to IS:2131 and IS:9640 respectively. The test shall be conducted immediately after reaching to the test depth and cleaning of bore hole.
- 2.3.B.4 The test shall be carried out by driving a standard split spoon sampler in the bore hole by means of a 650N hammer having a free fall of 0.75 m. The sample shall be driven using the hammer for 450mm recording the bumper of blows for every 150mm. The number of blow for the last 300mm drive shall be reported as N value.
- 2.3.B.5 This test shall be discontinued when the blow count is equal to 100 or the penetration is less than 25 mm for 50 blows. At the level where the test is discontinued, the number of blows and the corresponding penetration shall be reported. Sufficient quantity of disturbed soil samples shall be collected from the

split spoon sampler for identification and laboratory testing. The sample shall be visually classified and recorded at the site as well as properly preserved without loss of moisture content and labeled.

2.3.C Sampling

2.3.C.1 General

- a) Sufficient number of soil samples shall be collected. Disturbed soil samples shall be collected for soil identification and for conducting tests such as sieve analysis, index properties, specific gravity, chemical analysis etc. Undisturbed samples shall be collected to estimate the physical bearing capacity and settlement properties of the soil.
- b) All samples shall be identified with date, borehole or test pit number, depth of sampling, etc. The top surface of the sample in-situ shall also be marked. Care shall be taken to keep the core and box samples vertical, with the mark directing upwards. The tube samples shall be properly trimmed at one end and suitably capped and sealed with molten paraffin wax. The Contractor shall be responsible for packing, storing in a cool place and transporting all the samples from site to the laboratory within seven days after sampling with probe, protection against loss and damage.

2.3.C.2 Disturbed Samples

- a) Disturbed soil samples shall be collected in boreholes at regular intervals. Jar samples weighing approximately 1 kg shall be collected at 0.5m intervals starting from a depth of 0.5m below ground level and at every identifiable change of strata to supplement the boring records. Samples shall be stored immediately in air tight jars which shall be filled to capacity as much as possible.
- b) In designated borrow areas, bulk samples, from a depth of about 0.5m below ground level shall be collected to establish the required properties for use as a fill material. Disturbed samples weighing about 25kg (250N) shall be collected at shallow depths and immediately stored in polythene bags as per IS:1892. The bags shall be sealed properly to preserve the natural moisture content of the sample and placed in wooden boxes for transportation.

2.3.C.3 Undisturbed Samples

In each borehole undisturbed samples shall be collected at every change of strata and at depths as follows:

Location	Depths (m)
Normal Soils	1.0, 4.0, 6.0
Special Locations	1.0, 4.0, 6.0, 8.0,10.0 and thereafter at the rate of 3 m intervals up to 33m or refusal whichever occur earlier.

2.3.C.3.1 The spacing between the top levels of undisturbed sampling and standard penetration testing shall not be less than 1.0m. Undisturbed samples shall be of 100mm diameter and 450mm in length. Samples shall be collected in a manner to preserve the structure and moisture content of the soil Accessories and sampling procedures shall conform to IS:1892 and IS:2132

a) Undisturbed sampling in cohesive soil :

Undisturbed samples in soft to stiff cohesive soils shall be obtained using a thin walled sampler. In order to reduce the wall friction, suitable precautions, such as oiling the surfaces shall be taken. The sampling tube shall have a smooth finish on both surfaces and a minimum effective length of 450mm. The area ratio of sampling tubes shall be less than 12.5%. However, in case of very stiff soils area ratio up to 20% shall be permitted.

b) Undisturbed sampling in very loose, saturated, sandy and silty soils and very soft clays :

Samples shall be obtained using a piston sampler consisting of a cylinder and piston system. In soft clays and silty clays, with water standing in the casing pipe, piston sampler shall be used to collect undisturbed samples in the presence of expert supervision.

Accurate measurements of the sampling depth, dimensions of sampler, stroke and length of sample recovery shall be recorded. After the sampler is pushed to the required depth, the cylinder and piston system shall be drawn up together, preventing disturbance and changes in moisture content of the sample;

c) Undisturbed sampling in cohesion less soils

Undisturbed samples in cohesion less soils shall be obtained in accordance with IS:8763. Sampler operated by compressed air shall be used to sample cohesion less soils below ground water table.

2.3.D Ground Water

2.3.D.1 One of the following methods shall be adopted for determining the elevation of ground water table in boreholes as per IS:6935 and the instructions of the Owner:

- a) In permeable soils, the water level in the borehole shall be allowed to stabilize after depressing it adequately by bailing before recording its level. Stability of sides and bottom of the boreholes shall be ensured at all times.
- b) For both permeable and impermeable soils, the following method shall be suitable. The borehole shall be filled with water and then bailed out to various depths. Observations on the rise or fall of water level shall be made at each depth. The level at which neither fall nor rise is observed shall be considered the water table elevation and confirmed by three successive readings of water level taken at two hours interval.

2.3.D.2 If any variation of the ground water level is observed in any specific boreholes, the water level in these boreholes shall be recorded during the course of the filed investigation. Levels in nearby wells, streams, etc., if any, shall also be noted in parallel.

2.3.D.3 Subsoil water samples

- a) Subsoil water samples shall be collected for performing chemical analysis. Representative ground water samples shall be collected when first encountered in boreholes and before the addition of water to aid boring or drilling.
- b) Chemical analysis of water samples shall include determination of pH value, turbidity, sulphate, carbonate, nitrate and chloride contents, presence of organic matter and suspended solids. Chemical preservatives may be added to the sample for cases as specified in the test methods or in applicable Indian Standards. This shall only be done if analysis cannot be conducted within an hour of collection and shall have the prior written permission and approval of the Owner.

2.4 Laboratory Testing

2.4.A Essential Requirements

- a) Depending on the types of substrata encountered, appropriate laboratory tests shall be conducted on soil and rock samples collected in the field. Laboratory tests shall be scheduled and performed by qualified and experienced personnel who are thoroughly conversant with the work. Tests indicated in the schedule of items shall be performed on soil, water and rock samples as per relevant IS codes. One copy of all laboratory test data records shall be submitted to Owner progressively every week. Laboratory tests shall be carried out concurrently with the field investigations as initial laboratory test results could be useful in planning the later stages of field work. A schedule of laboratory tests shall be established by Contractor to the satisfaction of the Owner within one week of completion of the first borehole;
- b) Laboratory tests shall be conducted using approved apparatus complying with the requirements and specification of Indian Standards or other approved standards for this type of work. It shall be checked that the apparatus are in good working condition before starting the laboratory tests. Calibration of all the instruments and their accessories shall be done carefully and precisely at an approved laboratory.

2.4.A1 Tests

Tests as indicated in these specifications and as may be requested by the Owner, shall be conducted. These tests shall include but may not be limited to the following:

- a) Tests of undisturbed and disturbed samples
Visual and engineering classification, Sieve analysis and hydrometric analysis, Liquid, plastic and shrinkage limits, Specific gravity, Chemical analysis, Swell pressure and free swell index determination, Proctor compaction test.
- b) Tests of undisturbed samples:
Bulk density and moisture content, Relative density(for sand), Unconfined compression test; Box shear test (for sand), Triaxial shear tests (depending on the type of soil and field conditions on undisturbed or remolded samples Unconsolidated undrained, Consolidated drained test),
- c) Chemical analysis of sub soil water.

2.4.B Salient Test Requirement

- a) Triaxial shear tests shall be conducted on undisturbed soil samples, saturated by the application of back pressure. Only if the water table is at sufficient depth so that chances of its rising to the base of the

footing are small or nil, the triaxial tests shall be performed on specimens at natural moisture content. Each test shall be carried out on a set of three test specimens from one sample at cell pressures equal to 100, 200 and 300 KPa respectively or as required depending on the soil conditions:

- b) Direct shear test shall be conducted on undisturbed soil samples. The three normal vertical stresses for each test shall be 100, 200 and 300 KPa or as required for the soil conditions;
- c) Consolidation test shall have loading stages of 10, 25, 50, 75, 100, 200, 400 and 800 KPa. Rebound curve shall be recorded for all samples by unloading the specimen at its in-situ stress. Additional rebound curves shall also be recorded wherever desired by the Owner;
- d) Chemical analyses of subsoil shall include determination of PH value, carbonate, sulphate (both SO₃ and SO₄), chloride and nitrate contents, organic matter, salinity and any other chemicals which may be harmful to the foundation material. Their contents in the soil shall be indicated as percentage (%);
- e) Chemical analysis of subsoil water samples shall include the determination of properties such as colour, odour, turbidity, PH value and specific conductivity, the last two chlorides, nitrates, organic matter and any other chemical harmful to the foundation material. The chemical contents shall be indicated as parts per million (PPM) based on weight.

SUMMARY OF RESULTS OF LABORATORY TESTS ON SOIL AND WATER SAMPLES

1. Bore hole test pit. no
2. Depth (m)
3. Type of sample
4. Density(kg/m³)
 - a) Bulk (b) Dry. **d**
5. Water content (%)
6. Particle Size (%)
 - a) Gravel (b) Sand (c) Silt (d) Clay
7. Consistency properties
 - a) LL (b) PL (c) PI (d) LI
8. Soil
 - a) Classification –IS, (b) Description, (c) Specific gravity
9. Strength Test
 - a) Type (b) C (Cohesion) (c) Ø (angle of internal friction)
 - d) Angle of repose
- e) Consolidation Test
 - e₀, P_c, C_c, DP, M_v, C_v
- f) Shrinkage limit(%)
- g) Swell Test
 - S.Pr, FS
- h) Relative Density (%)
- i) Remarks

Notations:

I. For type of Sample:

- DB - Disturbed bulk soil sample., DP - Disturbed SPT soil sample
- DS - Disturbed samples from cutting edge of undisturbed soil sample.
- RM - Remoulded soil sample, UB - Undisturbed block soil sample
- US - Undisturbed soil sample by sampler, W - Water sample

II. For Strength Test :

- SCPT - Static Cone Penetration Test, UCC - Unconfined Compression Test
- VST - Vane Shear Test, Tuu - Unconsolidated Undrained Triaxial Test
- Note: Replace T by D for Direct Shear Test
- Tod - Consolidation Drained Triaxial Test

III. For Others :

LL - Liquid Limit (%), PL - Plastic Limit, PI - Plasticity Index
 LI - Liquidity Index, C - Cohesion (kPa), ϕ - Angle of Internal Friction (degrees)
 S-Pr. - Swelling Pressure (kPa), e_0 - Initial Void Ratio
 Pc - Reconsolidation Pressure (kPa), Cc - Compression Index
 DP - Change in Pressure (kPa),
 m_v - Coefficient of Volume Compressibility (m²/ KN)
 C_v - Coefficient of Consolidation (m²/hr)

IV. For Chemical Test

As per Specifications - Clause 2.4.D

2.4.C Recommendations

- a) Recommendations shall be provided for tower location duly considering soil type and tower spotting data. The recommendations shall provide all design parameters and considerations required for proper selection, dimensioning and future performance of tower foundations considers such investigations necessary.

2.4.D Hydro geological Conditions

2.4.D.1 The maximum elevation of ground water table, amplitudes of its fluctuations and data on water aggressivity with regard to foundation structure materials shall be reported. While preparing ground water characteristics the following parameters should be specified for each aquifer:

- bicarbonate alkalinity mg-eq/(deg),
- pH value
- content of aggressive carbon dioxide, mg/l;
- content of magnesia salts. mg/l, recalculated in terms of ions Mg⁺²;
- content of ammonia salts, mg/l, recalculated in terms of ions NH₄⁺
- content of caustic alkalis, mg/l, recalculated in terms of ions Na⁺ and K⁺
- contents of chlorides, mg/l recalculated in terms of ions Cl⁻
- contents of sulphates, mg/l, recalculated in terms of ions SO₄⁻²
- aggregate content of chlorides, sulphates, nitrates, carbonates and other salts. mg/l.

2.5 Rates and Measurements

2.5.A Rates

The contractor's quoted rates shall be inclusive of making observations, establishing the ground level and co-ordinates at the location of each borehole, test pit etc. No extra payments shall be made for conducting Standard Penetration Test, collecting, packing, transporting of all samples and cores, recording and submittal of results on approved formats.

The contractor at mutually agreed rates shall carry out the testing of soil in the River beds if required.

2.6 Codes and Standards for Geotechnical Investigations

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions. In case of conflict between the present specifications and those referred to herein, the former shall prevail. Internationally accepted standards which ensure equal or higher performance than those specified shall also be accepted.

All work shall be carried out in accordance with the following Indian Standards and Codes:

Indian Standards (IS)	Title	International Standard/Code
IS:1080-1990	Codes of Practice for Design and Construction of Simple Spread Foundations.	
IS:1498-1992	Classification and Identification of Soils for General Engineering purposes.	ASTM D 2487 ASTM D2488
IS:1892-1992	Code of Practice for Subsurface Investigation for Foundation	
IS:1892-1992	Code of Practice for Subsurface Investigation for Foundation	
IS:1904-1986	Code of Practice for Design and Construction of foundation in Soils: General Requirements.	

Indian Standards (IS)	Title	International Standard/Code
IS:2131-1992	Method of Standard Penetration Test for Soils	ASTM D 1586
IS:2132-1992	Code of Practice for Thin Walled Tube Sampling of Soils	ASTM D 1587
IS:2720-1992	Method of Test for Soils(Relevant Parts)	ASTM D 420
IS:3025	Methods of Sampling and Testing(Physical and Chemical) for water used in Industry	
IS:4091-1987	Code of Practice for Design and Construction of Foundations for Transmission Line Towers and Poles.	
IS:4434-1992	Code of Practice for In-situ Vane Shear Test for Soils	ASTM D 2573 ASTM D 4648
IS:4453-1992	Code of Practice for Exploration by Pits, Trenches, Drifts and Shafts.	
IS:4464-1990	Code of Practice for Presentation of Drilling information and core description in Foundation investigation	
IS:4968(Part-II)1992	Method for Subsurface sounding for soils, dynamic method using cone and Bentonite slurry.	
IS:5313-1989	Guide for Core Drilling observations.	
IS:6403-1990	Code of Practice for Determination of Allowable Bearing Pressure on Shallow Foundation.	ASTM D 194
IS:6935-1989	Method of Determination of Water level in a Bore Hole.	
IS:7422-1990	Symbols and Abbreviations for use in Geological Maps Sections and subsurface Exploratory Logs (Relevant parts).	
IS:9259-1992	Specification for Liquid Limit Apparatus.	ASTM D 4318

FOUNDATION

The construction of tower foundation shall be accordance with IS 4091: 1979

3.0 EXCAVATION

Excavation work in the section must not be started until the tower schedule and profile of that section has been approved by the Owner.

Pit marking shall be carried out accordance to tower schedule chart

Except as specifically otherwise provided, all excavation for footing shall be made to the lines and grades of the foundation. For estimation purposes, the excavation walls shall be vertical and the pit dimensions shall be such as to allow a clearance of 150 mm on all sides from the foundation pit, where form boxes are used. In undercut / stepped (slab type) foundations where form box is not required to be used at the base, the pit dimensions should be as per the standard drawing. All excavations shall be protected so as to maintain a clean sub-grade, until the footing is placed, using timbering, shoring or casing, if necessary. Any sand, mud, silt or other undesirable materials which may have accumulated in the excavation shall be removed by the contractor before placing concrete.

3.1 The soil to be excavated for tower foundations shall be classified as under for the purpose of payment for excavation for tower site leveling and building stone revetment:

- (a) Dry soil : Soil removable by means of ordinary pick axes and shovels (Normal soil, intermediate soil and black cotton soil, Partial black cotton soil sandy soil fall under this category).
- (b) Wet soil : Soil as per (a) above, where the subsoil water table is encountered within the range of foundation depth, the soil below the water table and that at locations where pumping or bailing out of water is required due to presence of surface water, will be treated as wet soil.(partially submerged & fully submerged soil fall under this category)
- (c) Soft Rocks: This will mean fissured rock i.e. decomposed rock, hard gravel, kankar, limestone, laterite or any other soil of similar nature which can be easily excavated with pick axe or spade. (Soft rock/Fissured Rock, Submerged fissured rock fall under this category)
- (d) **Hard Rocks**: **Hard rock will be that which requires chiseling or drilling and blasting.**

3.1.1 **No extra charges shall be admissible for the removal the fallen earth in the pits when once excavated. Shoring and strutting shall be done keeping in view the requirement given in IS-3764: 1966. In pit excavated in sandy soil or water bearing strata and where there is every like hood of pit collapsing.**

3.1.2 **If water is encountered in the foundation pit, de-watering will have to be done. The cost of dewatering shall be deemed to be included in the unit rates of foundations indicated by the Bidder in his offer. The guideline for dewatering during construction specified in IS-9759:1981 shall be kept in view.**

3.1.3 **For foundation in rock, where blasting is unavoidable, care should be taken to minimize the amount of concrete necessary for filling up the blasted area. The blasted area shall be reduced to the minimum possible so that the specified form for the foundation could be obtained. No extra payment for excavation in hard rock shall be allowed if the excavated area exceeds the designed excavation volumes. Similarly, no extra payment shall be made if concreting; reinforcement volume exceeds the designed volume due to excessive blasting. During execution of work in rock the provision given in IS-4081:1986 shall be fallow. For excavation in hard rock blasting can be resorted to. Reference shall be made to statutory rules for blasting & use of explosives for this purpose.**

3.1.5 **The contractor shall arrange requisite blasting material, excavation and drilling equipment at his own cost and the quoted rates shall be deemed to be inclusive of such costs.**

3.1.6 **Indian Standard IS: 3764 shall be followed regarding safety of excavation work**

3.2 **BENCHING:-**

When the line passed through hilly/undulated terrain, levelling the ground may be required for casting of tower footings. All such activities shall be termed benching and shall include cutting of excess earth and removing the same to a suitable point of disposal as required by Owner. Benching shall be resorted to only after approval from Owner. Volume of the earth to be cut shall be measured before cutting and approved by Owner for payment purpose. Further, to minimise benching, unequal leg extensions shall be considered and provided if found economical. The proposal shall be submitted by the Contractor with detailed justification to the Owner.

3.3 **SETTING OF STUBS:-**

The stubs shall be set correctly in accordance with approved method at the exact locations and alignment and in precisely correct levels. The stub setting templates shall be used for proper setting of stubs. Stubs shall be set in the presence of Board's representative available at site whenever required and for which adequate advance intimation shall be given to the site Engineer by the contractor.

The foundations are to be made as per designs and drawings approved by the Board. The extent of work as defined by such drawings shall not be exceeded except in very special cases where the prior approval of the Board has been obtained.

Each tower shall be provided with suitable foundation based on the approved designs after classification of soil. The soil classification shall be done after digging a small section of a pit upto full depth (excluding hard rock locations). The soil should be classified strictly as per details encountered in the foundation pit, as per clause 4.42 of Sec.IV-A & as per IS-5613 (part 3/sec 2):1989 clause 9. For example, dry soil foundations should be adopted at the locations where dry soil is encountered in the full depth of foundation. Similarly the wet type foundation should be adopted at the locations where water level is met at level of 1.5 metre or more below the ground level or in paddy fields or other places, which remain in surface water for long periods with water penetration not exceeding one meter below the ground level. Deviation, if any, from the approved / specified conditions shall be brought to the notice of C.E. (Transmission) through site Engineer before taking up the work and his decision shall be final and communicated through site Engineer. If at a later date, it is found that the contractor has carried out some work, not according to the specification and without taking specific approval, than in that case, entire payments made to the contractor for carrying out such works shall be recovered and the contractor will have to rectify the same at the rates indicated in the order for carrying out such work and without extension of time.

The setting of stubs in hard rock foundation may require cutting of stubs depending on depth at which hard rock is encountered. The cutting of stubs and drilling of new holes for fixing cleats etc. shall be considered inclusive in the rate of foundation of towers in hard rock.

Setting of stub at each location shall be approved by the Board's site Engineer. This approval shall not however, absolve the contractor of his responsibility of correct setting of stubs and casting of foundations, who will be required to rectify the faulty work at his own expense.

The allowable tolerance on template setting shall be IS-5613(part 3/sec 2) : 1989 Ann.C

3.4 **PLACEMENT OF REINFORCEMENT:**

- i. Tower foundation may be designed with steel reinforcement so as to achieve better foundation strength with lesser space. The contractor will indicate in relevant schedules, the details of reinforcement to be provided along with the weight and size of steel rods. The cost of placing of reinforcement steel, binding etc. in the foundation pit shall be deemed to be included in the quoted rates of foundation of towers.
- ii. All reinforcement shall be properly placed according to design drawing with a min. concrete cover of 50

mm

- iii. The reinforcement steel shall be arranged by the contractor at his own cost. The reinforcement bars will have to be properly cut, bent in required shape and placed in the foundation in approved manner after due cleaning of soil grease or organic matter. The reinforcement shall be properly tied by binding wire of not less than 0.9 mm. the work shall confirmed to IS 2502 :1963/ IS-5613(part 3/sec 2) : 1989 wherever applicable

3.5 CONCRETE:

- i. The cement concrete used for the main foundation shall be of M 20 1:1.5:3. and For lean concrete sub-base or pad M 10 1:3:6 mix cement concrete be used . The property of concrete and mix proportions shall be as per IS 456.
- ii. The coarse aggregates (stone metal) to be used shall be single size aggregate 40 mm nominal size for pyramid / slab portions concrete and 20 mm nominal size for chimney portion concrete confirming to IS 383 :1970 . For RCC, the aggregates shall preferably be of 20 mm nominal size.
- iii. The cement required for the purpose of foundations, building revetment walls etc. shall be arranged by the contractor at his own cost.
- iv. The sand used for the concrete shall be composed of hard silicate materials. It shall be clean and of a sharp angular grit type and free from earthy or organic matter and deleterious salts. The fine aggregate (sand) shall be of zone-I grade to IS 383:1970 which is the course variety. Zone –II grade of fine aggregates may also be used.
- v. The aggregate shall be of clean broken hard granite or other stone specified or approved by the Board. It shall be of hard, coarse-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. 40 mm aggregate shall be of size as will pass through a mesh of 40 mm measured in the clear and 20 mm aggregate through 20 mm square mesh measured in clean.
- vi. The water used for mixing concrete shall be fresh clean and free from oil, acid and alkali, organic materials or other deleterious substances, Salty / Saline or brackish water should not be used. Potable water is generally satisfactory.
- vii. The concrete shall be mixed in a mechanical mixer. However in case of locations not accessible for concrete mixers, hand mixing may be permitted at the discretion of our site Engineer. mixing placing and compacting of concrete shall be done as per IS-5613 (part3/sec2) : 1989 clause 11.10 and Ann. D
- viii. Mixing shall be continued until there is uniform distribution of materials and the mixing is uniform in colour and consistency but in no case the mixing be done for less than two minutes, Normally mixing shall be done close to the foundation but in case it is not possible, the concrete may be mixed at nearest convenient place. The concrete shall be transported from the place of mixing to the place of final deposit as rapidly as practicable by methods which shall prevent segregation or loss of any ingredient. The concrete shall be placed and compacted before setting commences.
- ix. The concrete shall be mixed as stiff as the requirements of placing the concrete in the form boxes, with ease and the degree to which the concrete resists segregation. Hence the quantity of water used should not be too much.
- x. Proper form boxes, adequately braced to retain proper shape while concreting should be used for chimney or pyramid and slab portions. The form boxes should be made water tight so that the cement cream should not come out leaving only sand and jelly consequently forming of honey combing in the concrete. The form boxes shall be cleaned and oiled before these are used for concreting.
- xi. The concrete shall be laid in 150 m.m. layers and consolidated well so that the cement cream works up to the top and no honey combing is left in the concrete. The concreting is to be done continuously so that the subsequent layers are laid before the initial setting of the bottom layer begins. The consolidation of concrete shall normally be done by using vibrators.
- xii. After concreting the chimney portion 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 coping.
- xiii. In wet locations, the site must be kept completely de-watered both during placing of the concrete and for 24 hours after completion. There should be no spilling to concrete during this period.
- xiv. The form boxes shall not be removed at least 24 hours after the completion of concreting after removal

of the forms, the concrete surface, wherever required shall be repaired with a mixture of rich cement and sand mortar in the shortest possible time.

3.6 **BACKFILLING AND REMOVAL OF STUB TEMPLATES:**

- i. Following opening of the form work and removal of shoring and shuttering, if required, backfilling shall be started after 24 hours of casting repairs, if any, to the foundation concrete. Backfilling shall normally be done with the excavated soil, unless, it is a clay type or it consists of large boulders/stones which shall be broken to a maximum size of 80 mm. At locations where borrowed earth is required for backfilling, Contractor shall bear the cost irrespective of lead and lift.
- ii. The backfill materials should be clean and free from organic or other foreign materials. A clay type soil with a grain size distribution of 50% or more passing the 200 sieve as well as a black cotton soil are unacceptable for backfilling. The earth shall be deposited in maximum 200mm layers, levelled, wetted if necessary and compacted properly before another layer is deposited.
- iii. The back filling and grading shall be carried out to an elevation of about 75 mm. above the finished ground level to drain out water. After backfilling, 50 mm. high earthen embankments (bund) will be made along the sides of excavation pits and sufficient water will be poured in the back filled earth for at least 24 hours. After the pits have been backfilled to full depth the stub template can be removed.
- iv. The stub setting templates shall be opened only after the completion of back filling.
- v. After completing the stringing work, if level of back filling of some of the location gets settled and it is required to back fill the locations again, the same would be done by the contractor at no extra cost.
- vi. No extra charge is admissible for carrying out the back filling of foundation pit (including backfilling from borrowed earth if required) and the cost of backfilling is included in the cost of foundations of towers.

3.7 **CURING:-** The concrete after it is 24 hours old shall be cured by keeping the concrete wet continuously for a period of 14 days after laying. The pit may be back filled with selected earth sprinkled with necessary amount of water and well consolidated in layers not exceeding 200 mm of consolidated thickness after a minimum period of 24 hours and thereafter both the back filled earth and exposed chimney top shall be kept wet for remaining period of the prescribed time of 14 days. The uncovered concrete chimney above the back filled earth shall be kept wet by providing empty cement bags dipped in water fully wrapped around the concrete chimney for curing ensuring that the bags are kept wet by frequent pouring of water on them. The contractor may use anti-curing paint.

3.7.1 **SHORING OF PITS:-**

Shoring of the pits with shuttering on the internal wall surrounding the vertical facing of approved dimensions of the pit shall be done when the soil condition is so bad that there is likelihood of accidents due to falling of surrounding earth in foundation pit. The cost of carrying out shoring and shuttering shall be deemed to be included in the unit rate of foundation of tower and no extra payment shall be made on this account.

3.8 **TOWER EARTHING:-**

The Galvanized pipe Earthing are to be provided on two legs diagonally of the tower. Each tower shall be earthed before the foundation is casted as per tender clause 4.33 Section IV-A

The tower footing resistance of all towers shall be measured in dry weather after the erection and before stringing of earth wire the counter poise earthing shall be resorted to, in accordance with the instructions of the site Engineer, in case the resistance exceeds the specified value. It shall be ensured that the tower footing resistance is less than 10 Ohms. Each tower footing resistance shall be intimated (along with tower location number) while submitting the progress report of the foundation.

3.8.1 **COUNTER POISE EARTHING:-**

In case of high resistivity, counter poise earthing shall be provided which consists of four lengths of galvanized steel stranded wire, each fitted with a leg / clamp for connection to the tower leg at one end. The counter poise will be laid radially away from the tower and will normally be 30 metres in length,

buried to the depth of 01 meter below ground level. The length of counter poise wire may be increased if the resistance requirements are not met. Connecting clamps shall be buried in the chimney portion of the foundation. The scope of work of connecting counter poise to the tower leg shall be deemed to be included in the cost of laying of counter poise. The counter poise connecting wire and clamps will be arranged by the contractor. The counter poise shall preferably be laid through soft areas if available. The planning of laying counter poise shall be done as per approval of site Engineer. The cost of laying of counter poise shall be inclusive of excavation and back filling work.

The contractor shall have to provide Galvanized pipe earthing at the end of each counter poise wire and this may lead to getting required soil resistivity values. This work of additional Galvanized Earthing pipe shall be done extra which shall include the cost of providing such Galvanized Earthing pipe and clamp etc The earthing of towers to be done as per I.S.S. 5613 Part II & latest revision of I.S.S.

3.9 BUILDING STONE REVETMENT:

Stone revetment in 1:5 cement mortars shall be constructed by the Contractor at specified locations. The detailed proposal in consultation with the site Engineer, for carrying out revetment work shall be submitted to the O/o. ED/CE(P&P), through concerned Superintending Engineer, EHT Construction and approval shall be obtained before carrying out revetment work. The top seal cover of revetment work shall be done with 1:2:4 normal mixes. All materials including cement shall be provided by the contractor and cost of building revetment shall be deemed to include cost of such materials also i.e. Cement, sand, metal and stone. Curing of revetment shall be done as specified for tower foundation. The back filling of the inside of the revetment wall with Soil/borrowed earth will be paid for extra on per m³ basis and shall include its compacting and watering. The excavation for revetment foundation shall be paid at the rates as indicated by the bidder in Price Schedule. The revetment work, wherever necessary, shall have to be completed before taking up final tensioning work in the Section.

3.10 TOWER ERECTION, STRINGING AND INSTALLATION OF LINE MATERIALS

3.10.1 General

The scope of erection work shall include the cost of all labour, tools and plant such as tension stringing equipment and all other incidental expenses in connection with erection and stringing work. The stringing equipment shall be of sufficient capacity to string the bundle conductors of specified size

The Contractor shall be responsible for transportation to site of all the materials to be supplied by the Contractor as well as proper storage and preservation of the same at his own cost, till such time the erected line is taken over by the CSPTCL.

3.11 TOWER ERECTION / ASSEMBLY:-

Tower shall be erected after the concrete is at least 14 days old, but a gap of 24 days shall be preferred. The method followed for the erection of towers, shall ensure the points mentioned below:-

Straining of the members shall not be permitted for bringing them into position. It may, however, be necessary to match hole positions at joints and to facilitate this, Tommy bars not more than 450 mm. long may be used.

Before starting erection of an upper section, the lower section shall be completely braced and all bolts provided in accordance with approved drawings.

All plan diagonals relevant to a section of tower shall be placed in position before assembly of upper section is taken up.

The bolt positions in assembled towers shall be as per I.S:5613(Part-II/ section 2).

All blank holes, if any left, after complete erection of tower, are to be filled up by nuts and bolts of correct size.

Tower shall be fitted with number, phase and danger plate which shall be arranged by the contractor.

Anti climbing Devices: Barbed wire will be used at a height of approx. 3 meters as an anti climbing measure, which shall be arranged by the contractor. At every location three layers of barbed wires will be provided each inside and outside the tower in horizontal plane. Spacing between the layers with fixing arrangements shall be provided as per the provisions of IS-5613 (Part-II/Sec.1) 1976 with latest modifications. The angle pieces with notches for accommodating barbed wire shall be supplied with the tower members. After the barbed wire is placed in position in the notches, the notch opening shall be welded to avoid the theft of barbed wire and anti-corrosive treatment with cold galvanizing paint shall be given, as also in the case of bolts to be welded. Suitable locking arrangement (pad-lock) shall also be provided.

3.12 **Treatment of Minor Galvanisation Damage:-**

Minor defects in hot-dip galvanized members shall be repaired by applying at least two coats of zinc rich primer (having approx.90% zinc content) and two coats of enamel paint to the satisfaction of the CSPTCL before erection.

3.13 **TIGHTENING PUNCHING AND WELDING OF BOLTS AND NUTS**

- i. All nuts shall be tightened properly using correct sizes of spanners and torque wrench. Before tightening, it will be verified that filler (packing & spring), washers and plates are placed in relevant gaps between members; bolts of proper diameter size and length are provided and one spring washer used under each nut and in case of step bolts, spring washers shall be placed under the outer nut.
- ii. The tightening shall progressively be carried out from the top downwards, care being taken that all the bolts at every level are tightened simultaneously. The threads of bolts projecting outside. The nuts shall be punched at three positions at the periphery to ensure that the nuts are not loosened in course of time. If during tightening, a nut is found to be slipping or running over the bolt threads, the bolt together with the nut shall be replaced.
- iii. The threads of all the bolts projected outside the nuts shall be welded on entire circular length of the bolt. The welding shall be provided on complete bolts of tower from ground level to top level (canopy). However, for towers with +18 meter, +25 meter extension and special/ river crossing towers, the welding shall be provided from ground level to bottom cross arm level.
- iv. After welding zinc-rich primer having approximately 90% zinc content shall be applied to the welded portion. At least two coats of the paint shall be applied. The surface coated with zinc rich primer shall be further applied with two finish coats of high built enamel of the grade recommended by the manufacturer of the zinc rich primer. The coat of welding and paint including application of paint shall be deemed to be included in the erection price.

STRINGING

3.14 **INSULATOR HOISTING:-**

Suspension insulator strings shall be used for suspension towers and Double tension insulator strings on tension towers. Damaged insulators and fittings, if any, shall not be employed in the assemblies. Before hoisting all insulators shall be cleaned in a manner that will not spoil, injure or scratch the surface of the insulator, but in no case shall any oil be used for the purpose. For checking and soundness of insulator, IR measurement using 5 KV (DC) Megger shall be carried out on 100% insulators. Corona control rings/arcing horn shall be fitted in an approved manner. Torque wrench shall be used for fixing various line materials and components, such as suspension clamp for conductor and OPGW, etc., whenever recommended by the manufacturer of the same.

3.15 HANDLING OF CONDUCTOR AND OPGW:-

- a. Running Out of the Conductors as per IS-5613 (part 3/sec.2):1989 :
- a. The conductors shall be run out of the drums from the top in order to avoid damage. Conductors do not touch & rub against the ground or object which could cause scratches or damage the conductor strand. The Contractor shall be entirely responsible for any damage to tower or conductors during stringing.
 - b. A suitable braking device shall be provided to avoid damaging, loose running out and kinking of conductor. Care shall be taken that the conductors do not touch or rub against the ground or objects which could scratch or damage the strands.
 - c. The sequence of running out shall be from the top down in order to avoid damage due to chafing i.e. the OPGW shall be run out first followed in succession by the conductors. Unbalanced loads on towers shall be avoided as far as possible. Inner phase of line conductors shall be strung before the stringing of the outer phases is taken up.
 - d. The contractor shall take adequate steps to prevent clashing of sub conductors until installation of the spacers/spacer dampers. Care shall be taken that sub conductors of a bundle are from the same Contractor and preferably from the same batch so that creep behaviour of sub conductors remains identical. During sagging, care shall be taken to eliminate differential sag in sub-conductors as far as possible. However, in no case shall sag mismatch be more than 25mm.
 - e. Towers not designed for one sided stringing shall be well guyed and steps taken by the Contractor to avoid damage. Guying proposal along with necessary calculations shall be submitted by the Contractor to Owner for approval. All expenditure related to this work is deemed to be included in the bid price and no extra payment shall be made for the same.
 - f. When the transmission lines run parallel to existing energized power lines, the Contractor shall take adequate safety precautions to protect personnel; from the potentially dangerous voltage built up due to electromagnetic and electrostatic coupling in the pulling wire, conductors and earth wires during stringing operations.
 - g. The Contractor shall also take adequate safety precautions to protect personnel from potentially dangerous voltage build up due to distant electrical storms.

3.15.1 Running Blocks:

- i. The groove of the running blocks shall be of such a design that the seat is semicircular and larger than the diameter of the conductor/OPGW and it does not slip over or rub against the slides. The grooves shall be lined and with hard rubber or neoprene to avoid damage to conductor and shall be mounted on properly lubricated bearings.
- ii. The running blocks shall be suspended in a manner to suit the design of the cross-arm. All running blocks, especially at the tensioning end will be fitted on the cross-arms with jute cloth wrapped over the steel work and under the slings to avoid damage to the slings as well as to the protective surface finish of the steel work.

3.16 Repairs to Conductors:

- i. The conductor shall be continuously observed for loose or broken strands or any other damage during the running out operations.
- ii. Repairs to conductor if necessary, shall be carried out with repair sleeve.
- iii. Repairing of the conductor surface shall be carried out only in case of minor damage scuff marks, etc. The final conductor surface shall be clean, smooth and free from projections, sharp points, cuts, abrasions, etc.
- iv. The Contractor shall be entirely responsible for any damage to the towers during stringing.

- 3.17 CROSSINGS :** Derricks or other equivalent methods ensuring that normal services need not be interrupted nor damage caused to property shall be used during stringing operations where roads, channels, telecommunication lines, power lines and railway lines have to be crossed. However, shut down shall be

obtained when working at crossings of overhead power lines. The Contractor shall be entirely responsible for the proper handling of the conductor, OPGW and accessories in the field.

3.18 STRINGING OF CONDUCTOR AND OPGW:-

The stringing of the conductor for 400 KV shall be done by the control tension method. The equipment shall be capable for maintaining a continuous tension per bundle such that the sag for each conductor is about twenty percent greater than the sag specified in then stringing sag table.

- i. The Contractor shall give to site Engineer in Charge complete details of the stringing methods he proposes to follow. Prior to stringing the Contractor shall submit the stringing charts for the conductor and earth wire showing the initial and final sags and tension for various temperatures and spans along with equivalent spans in the lines for the approval of the Owner at least one month in advance. The stringing shall be carried out as per the stringing chart approved by the purchaser in accordance with the relevant standard. All the tolerances for the line shall be conforming to IS 5613.
- ii. A controlled stringing method suitable for simultaneous stringing of the stub conductors shall be used. The two conductors making up one phase bundle shall be pulled in a paid out simultaneously. These conductors shall be of matched length. Conductors or earth wires shall not be allowed to hang in the stringing blocks for more than 96 hours before being pulled to the specified sag.
- iii. Conductor creep are to be compensated by over tensioning the conductor at a temperature of 26⁰C lower than the ambient temperature or by using the initial sag and tensions indicated in the tables.
- iv. Suitable guying arrangement shall be made by the Contractor to ensure safety during stringing & final sagging operation.
- v. IS-5613 (part 3/sec.2):1989 shall be fallow for Stringing of conductor and earth wire.

3.19 JOINTING:

- i. When approaching the end of a drum length at least three coils shall be left in place when the stringing operations are stopped. These coils are to be removed carefully, and if another length is required to be run out, a joint shall be made as per the recommendations of the accessories manufacturer.
- ii. Conductor splices shall not crack or otherwise be susceptible to damage in the stringing operation. The Contractor shall use only such equipment/methods during conductor stringing which ensures complete compliance in this regard.
- iii. All the joints on the conductor and OPGW shall be of the compression type, in accordance with the recommendations of the manufacturer, for which all necessary tools and equipment like compressors, dies etc., shall be obtained by the Contractor. Each part of the joint shall be cleaned by wire brush till it is free of dust or dirt etc., and be properly greased with anti-corrosive compound. If required and as recommended by the manufacturer, before the final compression is carried out with the compressors.
- iv. All the joints of splices shall be made of at least 30 metres away from the structures. No joints shall be made in span crossing over main roads, railways and small rivers tension spans. Not more than one joint per sub conductor per span shall be allowed. The compression type fittings shall be of the self centering type or care shall be taken to mark the conductors to indicate when the fitting is centered properly. During compression or splicing operation; the conductor shall be handled in such a manner as to prevent lateral or vertical bearing against the dies. After compressing the joint the aluminium sleeve shall have all corners rounded, burrs and sharp edges removed and smoothened.
- v. During stringing of conductor to avoid any damage to the joint, the Contractor shall use a suitable protector for mid span compression joints in case they are to be passed over pulley blocks/aerial rollers. The pulley groove size shall be such that the joint along with protection can be passed over it smoothly.

3.20 TENSIONING & SAGGING OPERATIONS:

- i. The tensioning the sagging shall be done in accordance with the approved stringing charts or sag tables. The “initial” stringing chart shall be used for the conductor and final stringing chart for the OPGW. The conductors shall be pulled up to the desired sag and left in running blocks for at least one hour after which the sage shall be rechecked and adjusted, if necessary, before transferring the conductors from the running blocks to the suspension clamp. The conductor shall be clamped within 56 hours of sagging in.
- ii. The sag will be checked in the first and the last section span for sections up to eight spans, and in one additional intermediate span for sections with more than eight spans. The sag shall also be checked when the conductors have been drawn up and transferred from running blocks to the insulator clamps.
- iii. The running blocks, when suspended from the transmission structure for sagging, shall be so adjusted that the conductors on running blocks will be at the same height as the suspension clamp to which hit is to be secured.
- iv. At sharp vertical angles, conductor and OPGW sags and tensions shall be checked for equality on both sides of the angle and running block. The suspension insulator assemblies will normally assume vertically when the conductor is clamped.
- v. Tensioning and sagging operations shall be carried out in calm whether when rapid changes in temperature are not likely to occur.

3.21 CLIPPING IN:-

- i. Clipping of the conductors in position shall be done in accordance with manufacturer’s recommendation and approved by our Engineer. At suspension location free centre type suspension clamp with armour rod set or A.G.S. type suspension clamps shall be used.
- ii. The jumpers at the section and angle towers shall be formed to parabolic shape to ensure maximum clearance requirements. Pilot suspension insulator string shall be used, if found necessary, to restrict the jumper swing to the design values.
- iii. Fasteners in all fittings and accessories shall be secured in position. The necessary clip shall be properly opened and sprung into position.

3.22 FIXING OF CONDUCTORS AND EARTH WIRE ACCESSORIES:-

Conductor and earth wire accessories including spacers, bundle spacer (for bundle conductor) and vibration dampers shall be installed by the Contractor as per the design requirements and manufacturer’s instruction within 24 hours of the conductor/earth wire clamping and as per instruction of the Engineer. While installing the conductor and earth wire accessories, proper care shall be taken to ensure that the surfaces are clean and smooth and no damage shall occur to any part of the accessories or of the conductors. Torque wrench shall be used for fixing the Dampers, suspension clamps etc. and torque recommended by the manufacturer of the same shall be applied.

- 3.23 **REPLACEMENT:-** If any replacement are to be effected after stringing and tensioning or during maintenance, leg members and bracings shall not be removed without reducing the tension on the tower with proper guying or releasing the conductor. If the replacement of cross arm becomes necessary after stringing, the conductor shall be suitably tied to the tower at tension points or transferred to suitable roller pulleys at suspension points.

3.24 ELECTRICAL INSPECTOR’S INSPECTION FEES:-

Electrical inspector’s inspection fees to be deposited by the contractor and he has to obtain the clearance from Electrical Inspector before charging the line.

3.25 FINAL CHECKING, TESTING & COMMISSIONING:-

After completion of the works, final checking of the line shall be done by the contractor to ensure that all the foundation works; tower erection and stringing have been done strictly in accordance with the specifications and as approved by the Board. All works shall be thoroughly inspected keeping in view of the following main points:-

- i) Sufficient back filled earth is lying over each foundation pit and it is adequately compacted.
- ii) Concrete chimneys and their copings are in good finely shaped conditions.
- iii) All the tower members are correctly used, strictly according to the approved drawing and are free from defects or damages, what-so-ever.
- iv) All bolts are properly tightened, punched, and tack-welded and painted with zinc rich paint.
- v) The stringing of conductors and earth wire has been done as per the approved sag and tension charts and desired clearances are clearly available.
- vi) All conductor and earth wire accessories are properly installed.
- vii) All other requirements to complete the work like fixing the danger plate, phase plate, number plate, anti-climbing devices, aviation signal (wherever required) etc. are properly installed. The double coded painting has been done where required as per aviation rules.
- viii) Wherever required, it should be ensured that revetment is provided.
- ix) The line insulation is tested by the contractor by providing his own equipment, labour etc. to the satisfaction of the Board to ascertain the insulation conditions of the line.
- x) The original tracings of profile and route alignment as well as tower design, structural drawings, bill of material and shop drawings of all towers with all extensions are submitted to the Owner for reference and record.
- xi) All towers are properly grounded.
- xii) Conductor continuity test is carried out to verify that each conductor of the over head line is properly connected electrically.
- xiii) The line may be charged at a low value of power, frequency, voltage for the purpose of testing.
- xiv) The contractor should also fulfill the requirements of pre-commissioning procedure as given this tender Specification.

3.26 COMPLETION DESIGN:-

The contractors have to supply free of cost complete drawing and information to the Engineer in Charge:-
 “Complete as executed drawing of the line showing each and every structure as actually erected, double insulator points, roads and railway crossings, together with measured spans. All major or small river crossings shall also be indicated. At all deviation points the angles shall be marked in degrees. All kutcha and metalled roads, trees, structures, ponds and other obstructions etc. within 46 meters on either side of the route shall be clearly indicated. The drawings shall be drawn on good quality tracing cloth. These drawings shall also show any communication or Power lines within 50 meters on either side of the line.”

3.27 FIELD QUALITY PLAN

The contractor shall perform the construction/Erection work of line as per standard Field Quality Plan provided by CSPTCL.

Section-V

Technical Schedules, Annexures & Formats

ANNEXURE-1

Certificate issued by Chartered accountant

(To be furnished the Sole bidder/ Lead partner as well as other partner of the JV Separately)(Issued not earlier than the date of NIT)

Name & Address of the Bidder:-

Information from Balance Sheet

Particulars	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Total Assets					
Total Liabilities					
Net Worth					
Current Assets					
Current Liabilities					
Annual Turn Over					

Note:- Net worth means the sum, total of the paid up capital and free reserves (Excluding reserves created out of revaluation) reduced by aggregate value of accumulated losses

(Including debit balance in profit and loss account for current year) and intangible assets.

LIQUID ASSET :- As on(This date should not be older than the date of NIT) :-

Cash (and equivalents)	Bank deposits	Securities that can be freely traded	Receivables which has general certainty of getting realized	Others	Total Liquid Assets (1+5)
1	2	3	4	5	6
Rs.....	Rs....	Rs.....	Rs.....	Rs.....	Rs....

Information from Income Statement :-

Particulars	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Total Revenues					
Profits Before Taxes					
Profits After Taxes					
<ul style="list-style-type: none"> • Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last five years, as indicated above, complying with the following conditions. • All such documents reflect the financial situation of the Bidder. • Historic financial statements must be audited by a certified accountant. • Historic financial statements must be complete, including all notes to the financial statements. <p style="margin-left: 40px;">Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).</p>					

Date:-

Signature of Chartered Accountant

Place:-

(Seal)

ANNEXURE-2
AVERAGE ANNUAL TURNOVER

Annual Turnover Data for the Last 5 Years	
Year	Amount in Rs.
2015-16	
2016-17	
2017-18	
2018-19	
2019-20	
Average Annual Turnover	

The information supplied should be the Annual Turnover of the Bidder for each year for contracts in progress or completed.

Date:

Signature :

Name :

Status :

Seal of the Tendering Co. :

ANNEXURE-3

// VENDOR LIST //

As per approved vendor list appended in CSPTCL website:-

- i) The name of the vendors shall be as per the list displayed in CSPTCL's website www.cspc.co.in on date of issue of NIT
- ii) Other equipments/materials which are required but not covered in the above vendor list reputed make with prior approval of CSPTCL.
- iii) Other vendors who possess requisite manufacturing capability (wherever required), type test certificate and performance certificate as per criteria of CSPTCL may also be considered with specific approval of CSPTCL.
- iv) However, CSPTCL reserves right to add, delete, revise and specify any vendor subsequently and CSPTCL;s decision shall be final.

Date :

Signature :

Name :

Designation

ANNEXURE-4**CASH FLOW REQUIREMENT & CURRENT CONTRACT COMMITMENTS****A. FINANCIAL RESOURCES :-**

Proposed sources of financing : Specify proposed sources of financing, such as liquid assets, unencumbered real estates, lines of credit and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Pre-qualifying requirements.

S. No.	Source of financing	Amount (Rs.)
1		
2		
3		

B. CURRENT CONTRACT COMMITMENTS / WORKS IN PROGRESS :

Bidders and each member of JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
S. No.	Name of Contract	Employer's Contact Address, Tel, Fax	Value of Outstanding Work [Rs.]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [Rs.]
1					
2					
3					
4					
5					

Date:**Signature :****Name :****Status :****Seal of the Tendering Co. :**

ANNEXURE-5

DECLARATION FORM

Tender Specification No.TR-20/13

To,
The Executive Director (Planning & Project),
CSPTCL, Raipur

Sir,

Having examined the above specification together with tender conditions referred to therein. I/We the undersigned hereby offer to execute the work contract covered therein complete in all respect as per the specification and general conditions, at the rates entered in the attached contract Annexure of prices in the tender. Our offer is valid up to 180 days from the date of tender opening and the prices, which are on firm basis, will remain valid for two years or date of completion of work from the date of opening of tender whichever is later.

I/We hereby undertake to have the works completed within the time specified in the tender.

I/We certify to have purchased a copy of the specification by remitting cash, demand draft and this has been acknowledged by you in your letter No..... dtd.....

In the event of work order being decided in my/our favour, I/We agree to furnish the Bank Guarantee in the manner acceptable to CSPTCL and for the sum as applicable to me/us as provided in the General conditions of contract (Section-II) of this specification within 30 days of issue of work order, failing which I/We clearly understand that the said work order will be liable to be withdrawn by CSPTCL.

Signed this _____ day of _____

Yours faithfully

Date
Place

SIGNATURE OF TENDERER
NAME
DESIGNATION
(SEAL)

(This form should be duly filled up by the tenderer & submitted along with the original copy of tender.)

ANNEXURE-6

SCOPE OF WORK OF SOIL INVESTIGATION

- I. Please indicate details of soil investigation data which will be furnished by the Bidder, such as:
1. Type of soil and gradation.
 2. Bearing capacity at full foundation (at 3 and 4 meter) depth.
 3. Angle of repose (along with calculation and justification).
 4. Soil strata details up to full foundation depth.
 5. Possibility of submergence.
 6. Subsoil water occurrence/water table.
 7. Contractor shall indicate all other parameters which will be furnished by him for correct determination of soil characteristics.
- II. Please indicate below field and laboratory tests in details for determining various parameters of soils indicated under item 1 above, with full reference of relevant test standards.

Signature :

Name :

Status :

Date :

Seal of the tendering Co.:

ANNEXURE-7**LIST OF STRINGING EQUIPMENT AVAILABLE WITH THE CONTRACTOR**

(Under this schedule, the list of various stringing tools, plants available with the contractor shall be indicated).

S. No.	DESCRIPTION	MAKE & YEAR OF MANUFACTURE.	QUANTITY TO BE USED PER STRINGING GANG.	TOTAL QUANTITY AVAILABLE WITH THE CONTRACTOR.
1	2	3	4	5

Signature :

Name :

Date

Seal of the tendering Co.:

ANNEXURE-8
COMPLETION SCHEDULE

S.No.	DESCRIPTION OF WORK	PERIOD IN MONTHS FROM DATE OF ORDER		DATES CALENDAR MONTHWISE	
		Commencement	Completion	From	To
1.	Establishment Of Site Office & Stores.				
2.	Supply Of Stubs, Form Boxes Etc.				
3.	Supply Of Tower Parts & GI Nut Bolts.				
4.	Supply of Disc Insulators				
5.	Supply of conductor				
6.	Supply of ground wire				
7.	Supply of Stringing Hardware				
8	Survey				
9	Foundation Work				
10	Tower Erection.				
11	Stringing				
12	Testing & Commissioning				

Signature :

Name :

Date

Designation :

Seal of the tendering Co.:

NOTE:- Bar chart showing the commencement and completion of various activities indicated above for completion of line shall be furnished along with this schedule in the offer.

ANNEXURE-9**DEVIATIONS FROM TECHNICAL SPECIFICATIONS /CONDITIONS**

S. No .	SUBJECT	CSPTCL's SPECIFICATION CLAUSE REFERENCE AND PAGE NUMBER	PROPOSED DEVIATION BY THE TENDERER	REASONS FOR SUCH DEVIATION S
1	2	3	4	5

Signature :

Name :

Date :

Designation:

Seal of the tendering Co.:

ANNEXURE-10
QUESTIONNAIRE

Note : The bidders may please note that submission of this questionnaire duly and properly filled in is essential while in entries against the questions given below no reference should be made to comments entered elsewhere in the tender. All queries should be answered and these answers should be complete in themselves. Please note that none of the column should be left blank and clear reply against all columns should be furnished. In case this is not done the offers will be liable for rejection.

1)	<p>i) Name & Address of the bidder /firm/Company etc. a) Registered office b) Works c) Telex/fax Nos. d) Telephone Nos. (ii) Please mention whether tenderer is a company or proprietorship / partnership firm.</p>	
2)	<p>Bidders to furnish following information :- i) TIN Number ii) PAN iii) Bank details iv) Name of Bank v) A/c No. vi) IFS Code of the bank vii) Copy of cancelled cheque. (attach certified copies of above documents)</p>	
3)	Goods & Service Tax Registration Number	
4)	<p>i. Whether you are state or central govt. Undertaking/ unit with 100% government share. ii. If yes whether documentary evidence in support of the above has been enclosed. (in absence of documentary evidence your claim to be State/Central Govt. undertaking shall be ignored.)</p>	
5)	<p>Whether the required earnest money has been furnished by you? If yes, i. In which form. ii. Amount of earnest money furnished.</p>	
6)	Whether agreeable to clause of liquidity damage?	
7)	Please confirm that you are agreeable to payment terms for supply of towers / line materials and erection of line on turn key basis as specified in relevant clauses.	

8)	<p>(a) whether the rates quoted for supply of towers and accessories are :</p> <p>i. Ex-Works Or Otherwise. ii. Inclusive Or Exclusive Of Taxes.</p> <p>(b) Whether following taxes & at what rates are inclusive in the rates offered. If exclusive then at what rate the taxes will be charged extra :-</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Name of Tax</th> <th>Rate applicable</th> <th>Whether inclusive or exclusive</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GST</td> <td></td> <td></td> </tr> <tr> <td>1.1</td> <td>Tower parts</td> <td></td> <td></td> </tr> <tr> <td>1.2</td> <td>Conductor</td> <td></td> <td></td> </tr> <tr> <td>1.3</td> <td>Other materials</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>Cess under Building and other construction Workers Act 1996.</td> <td>Should be inclusive</td> <td></td> </tr> <tr> <td>3</td> <td>Any other tax</td> <td></td> <td>Pl. mention</td> </tr> </tbody> </table>	S.No	Name of Tax	Rate applicable	Whether inclusive or exclusive	1	GST			1.1	Tower parts			1.2	Conductor			1.3	Other materials			2	Cess under Building and other construction Workers Act 1996.	Should be inclusive		3	Any other tax		Pl. mention	Remarks
S.No	Name of Tax	Rate applicable	Whether inclusive or exclusive																											
1	GST																													
1.1	Tower parts																													
1.2	Conductor																													
1.3	Other materials																													
2	Cess under Building and other construction Workers Act 1996.	Should be inclusive																												
3	Any other tax		Pl. mention																											
9)	Whether you are agreeable to payment procedure clause for supply of materials and erection of line of this specification.																													
10)	Whether agreeable to line completion period clause of the tender ?																													
11)	Whether agreeable to guaranteed maintenance period clause of the specification.																													
12)	Whether agreeable to furnish a security deposit of an amount of 10% of the order including GST also indicate the form in which security deposit will be furnished i.e. cash, bank guarantee etc.																													
13)	Whether agreeable to submit price adjustment invoices for supply of tower & ACSR Conductor positively within 6 (six) months from date of supply of materials whether positive or negative as per tender clause 3.16.																													
14)	Whether a list of orders executed by you enclosed with full particulars of nature of work done.																													
15)	Name of 220 KV & above EHV lines constructed on turn key with supply of all materials & name of organisation	S.No. Orgn. Route length in km. Year of completion																												
16)	Whether you agree for inspection by CSPTCL's representative prior to dispatch and bear the testing charges for all tests as per is to be conducted on samples, drawn by CSPTCL's representative.	yes/no																												
17)	Whether testing facilities for carrying out the type, acceptance and routine tests as per relevant is																													

	specification, ion the materials offered are available with the manufacturer. If so, please furnish the list of testing machines and relevant details.	
18)	Have you taken into account the element of ‘modvat benefit’ on cost of raw material while offering ex-works prices. Will you pass on such benefit on this account to the CSPTCL?	
19)	Whether details of departures/ deviation from specification have been furnished in the respective schedule.	
20)	Whether profit and loss account and balance sheet for the last 5 years have been furnished.	
21)	Whether details of technical manpower of head office and field organisation furnished in respective schedule.	
22)	Whether agreeable to arrange the storage cum erection insurance of transmission line and materials as per relevant clause of the specification.	
23)	Whether agreeable to bear the cost of any octroi, duty of levy on materials provided by the contractor such as metal, sand etc.	
24)	Please indicate if use of private/forest/canal service of roads for transport of materials and constructional personnel is required, then the charges, if any, levied by the concerned authorities will be borne by you, without any extra cost to the CSPTCL.	
25)	Have you furnished the power of attorney in respect of the person signing the tender on behalf of the bidder?	
26)	Please Confirm That The Angle Sections, Plates Etc. Used In Manufacture Of Towers/ Structures Quoted In This Specification Shall Conform To The Relevant latest ISS.	
27)	Whether schedule of check list has been enclosed duly filled in.	
28)	i) Whether tower type test certificates is enclosed. ii) If type test certificates not enclosed, whether undertaking is enclosed? (To complete the type testing of tower following placement of contract without any extra cost to the CSPTCL) without effecting completion period.	

Note : The bidder may use above questionnaire sheets in original for furnishing reply along with this offer. However if separate sheets are used for this questionnaire, it may please be ensured that the serial order and language of questions is maintained.

Date:

Signature :

Name :

Seal of the bidder Co. :

ANNEXURE-11**Standards / codes**

The material and services converted under this specification shall be performed as per the requirement of the relevant standards / codes referred hereunder against each set of equipments and services:-

S. No.	INDIAN STANDARD I.S.	TITLE
1.	IS-209-1992	Zinc Ingots - Specifications.
2.	IS-2062-1992	Steel For General Structural Purposes - Specifications.
3.	IS-850-1994	Natural Sour (Lactic) Casein For Glue Manufacture.
4.	a) IS-802 (Part I) Sec-1-1995 Sec-2-1992 (b) IS:802 – 1990 (Part-2) (c) IS:802 – 1990 (Part 3)	Code of Practice for General Building Construction in Steel in Over Head Transmission Line Towers: Materials, loads and Permissible Stresses Section-1 Materials and loads Section 2 Permissible stresses. Code of practice for use of Structural steel in overhead Transmission Line : Fabrication, Galvanising, Inspection and Packing Code of practice for use of Structural Steel in overload Transmission Line Towers Testing.
5.	IS-1367-1992	Technical Supply Conditions For Threaded Fasteners.
6.	IS-2016-1992	Plain Washers
	IS-2551-1991	Danger Notice Plates
8.	IS-2629-1990	Recommended Practice For Hot Dip Galvanising Of Iron & Steel.
9.	IS-2633-1992	Method Of Testing Uniformity Of Coating Of Zinc Coated Articles.
10.	IS-3063-1994	Single Coil Rectangular Section Spring Washers For Bolts, Nuts, Screws.
11.	IS-5358-1969	Hot Dip Galvanising Coatings On Fasteners.
12.	IS-6610-1991	Specification For Heavy Washers For Steel Structures.
13.	IS-6730-1990	Method For Determination Of Weight Of Zinc Coating Of Zinc Coated Iron And Steel Articles.
14.	IS-5613-II-1993	Code Of Practice For Design, Installation And Maintenance Of Overhead Power Line Section 1 Designs. Section 2 Installation & Maintenance.
15.	IS-961	H.T. Steel

16.	IS-12427-1988	Bolts for Transmission line Towers
17.	IS-269-1967	Ordinary Rapid Hardening And Low Heat Portland Cement.
18.	IS-388-19	Coarse And Fine Aggregate From Natural Sources For Concrete.
19.	IS-278-1991	Specification For Barbed Wire.
20.	IS-1573-1986	Specification For Electro Plated Coating Of Zinc.
21.	IS-432-I,II-1966	Mild Steel & Medium Tensile Bars, And Hard Drawn Steel Wire For Concrete Reinforcement.
22.	IS-306-2000	Code Of Practice For Plain And Reinforced Concrete.
23.	IS-800-1991	Code Of Practice For Use Of Structural Steel In General Building Construction.
24.	IS-1139-1966	Hot Rolled Mild Steel Medium Tensile Steel And High Yield Strength Steel Deformed Bars For Concrete Reinforcement.
25.	IS-1489	PortlandPuzzolana Cement.
26.	IS-1786-1966	Cold Twisted Steel Bars For Concrete Reinforcement.
27.	IS-1893-1991	Criteria Of Earth Quake Resistant Design Of Structures.
28.	IS-3043-1991	Code Of Practice For Earthing
29.	IS-4091-1967	Code Of Practice For Design And Construction Of Foundation For TransmissionLineTowers& Poles.
30.	IS-2131-1967	Method Of Standard Penetration Test For Soil.
31.	IS-2614-1969	Method Of Sampling Of Fasteners.
32.	IS-4218-VI-1978	Isometric Screw Threads Limits Of Sizes For Commercial Bolts & Nuts.
33.	IS-3218-V-1979	Isometric Screw Thread's Tolerance
34.	IS-1367-III-1991	Mechanical Properties And Test Methods For Bolts, Screws & Studs With Full Load ability.
35.	IS-1367-VI-1994	Mechanical Properties And Test Methods For Nuts With Specified Proof Loads.
36.	IS-1363-III-1992	Specification For Hexagon Head Bolts, Screws And Nut For Product Grade "C" Hexagon Nuts On Property Class 5.
37.	IS-4072-1975	Specification For Steel For Spring Washers (First Revision).
38.	IS-6821-1973	Method Of Sampling Of Non Threaded Fasteners.
39.	IS-3202-1972	Method For Testing Local Thickness Of Electro-Plated Coatings.
40.	IS-1586-1968	Method Of Rockwell Hardness Test ("B" & "C") for Steel (first revision).

41.		Indian Electricity Rules-1956, And Revision Thereof.
42.		Publication No.87/Elec/112/1 Regulation For Electricity Crossing of Railway Tracks, As Amended Up-To-Date.
43.	ISI marked(IS:398(P-II) with latest amendment)	ACSR Conductor
44.	ISI marked (IS:2141/1968 with latest amendments)	Ground wire
30	IS:808-1991	Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections
46	IS:875-1992	Code of Practice for Design Loads (other than Earthquakes for Building and Structures.
47	IS:1477-1990	Code of practice for Painting of Ferrous Metals in Buildings; Part-1 Pre treatment Part-II Painting.
48	IS:1573-1991	Electro-plated coatings of zinc on iron and Steel
49	IS:1852-1993	Rolling and Cutting Tolerances of Hot Rolled Steel Products
50	IS:2074-1992	Ready Mixed Paint, Air Drying, Red Oxide, Zinc Chrome, Priming Specification
51	IS:3757-1992	High Strength Structural Bolts
52	IS:4759-1990	Specification for Hot zinc coatings on structural steel and other Allied products.
53	IS:5369-1991	General Requirements for Plain Washers.
54	IS:6623-1992	High Strength Structural Nuts.
55	IS:6639-1990	Hexagon Bolts for Steel Structure
56	IS:8500-1992	Specification for Weldable Structural Steel (Medium & High Strength Qualities)
57	IS:10238-1989	Step Bolts for Steel Structures.

ANNEXURE-12
LIST OF DRAWINGS

S.No.	PARTICULARS
1	Route Map of construction of 220KV line on Turnkey basis
2	Out Line Drawing Of 220KV line single 13 Unit Single Suspension Insulator String.
3	Out Line Drawing Of 220KV line 2x13 unit Double Suspension Insulator String.
4	Out Line Drawing Of 220KV line single 14 Unit Single Tension Insulator String.
5	Out Line Drawing Of 220KV line 2x14 unit Double Tension Insulator String.
6	OPGW Suspension Assembly.
7	OPGW Tension Assembly.
8	Details Of Earthing Arrangement For Towers.
9	Number Plate / Circuit Plate For 220KV Transmission Line.
10	Danger Board / Phase Plate For 220KV Transmission Line.
11	Caution Notice Plate For 220KV Transmission Line.

- a) The drawing from Sl. No.2 to 7 shall be submitted by the contractor to CE (P&P) Office for approval before execution of the work.
- b) The drawing from Sl. No.8 to 11 are enclosed.

ANNEXURE-13**DETAILS OF HEADQUARTERS & FIELD ORGANISATION OF THE TENDERER**

(Under this schedule the strength of technical manpower available with the bidder with their qualification and experience shall be indicated, both in respect of head-quarter and field organisation.)

Date:

Signature :

Name :

Status :

Seal of the bidder Co. :

ANNEXURE-14**DETAILS OF PLANT & MANUFACTURING CAPACITY**

S.No.	Particulars	Details of information asked
1.	Name of manufacturer	
2.	Installed Yearly Fabrication Capacity (MT).	
3.	Installed yearly galvanising capacity (Metric ton).	
4.	Year Of Installation Of Fabrication / Galvanisation Facility.	
5.	Tonnage Fabricated In Last 3 Years (i.e., 2017-18 2018-19 & 2019-20):- S.No. Period i) ii) iii)	
6.	Tonnage galvanized in last 3 years (i.e.2017-18 2018-19 & 2019-20):- S.No. Period i) ii) iii)	
7.	Whether existing galvanising plant is suitable to galvanise 6 M length steel members and 750x750 mm steel plates in a single dip. Please also indicate the size of galvanising bath.	
8.	Total tonnage of order under execution.	
9.	Monthly rate at which pending orders to be executed.	
10.	Is spare capacity enough to supply towers at the proposed rate against present specification. Give details, if spare capacity is not enough how bidder proposes to meet the supply against the present tender.	

Date:

Signature:

Name:

Status:

Seal of the bidder Co.:

ANNEXURE-15

EXPERIENCE IN FABRICATION AND SUPPLY OF TOWERS. (INFORMATION SHALL BE GIVEN IN RESPECT OF 220KV, 400 KV DCDS & ABOVE TOWERS IN LAST THREE FINAICAL YEARS)

S.No.	Particulars	Name of the Utility
1.	Name Of The Line And Its Voltage Class.	
2.	Address Of Order Placing Authority.	
3.	Order No. & Date	
4.	Value Of The Order	
5.	No. & Type Of Towers Fabricated And Supplied.	
6.	Tonnage Of Towers Supplied During last three years :- i. ii. iii.	
7.	Remark.	

Date:

Signature

Name :

Status :**Seal of the bidder Co. :**

ANNEXURE-16**EXPERIENCE IN ERECTION OF 132 KV & ABOVE TRANSMISSION LINES ON TURN KEY WITH SUPPLY OF ALL MATERIAL (COMPLETED WORKS, WHICH ARE IN SUCCESSFUL OPERATION FOR A PERIOD OF NOT LESS THAN 01 YEAR)**

S.No	Particulars	Name of the Utility
1.	Name Of The Line And Its Voltage Class.	
2.	Double Circuit Or Single Circuit.	
3.	Address Of The Order Placing Authority.	
4.	Order No. & Date	
5.	Scheduled date of completion as per order	
6.	Whether time extn. has been granted	
7.	Value Of The Order.	
8.	Length Of The Line.	
9.	Please Indicate Work-Wise Details.	
10.	Scope Of The Work And Activity Completed. i. Survey (Full/Part) ii. Soil Investigation (Full/Part) iii. Foundation (Full/Part) iv. Tower Erection (Full/Part) v. Stringing (Full/Part) vi. Supply of tower and line materials vii. Supply of ACSR Conductor viii. Supply of Disc Insulators ix. Supply of OPGW x. Supply of Stringing Hardware	
11.	Month And Year of commencement and Completion of Erection Work.	
12.	Remark.	

Date:

Signature :

Name :

Status :

Seal of the bidder Co. :

ANNEXURE-17**LIST OF TOOLS AND PLANTS REQUIRED FOR CONSTRUCTION OF LINE, TO BE
ARRANGED BY THE CONTRACTOR**

(Under this schedule, list of tools and plants required for execution of various activities like survey, soil investigation, excavation, stub setting, concreting, erection and stringing etc available with the contractor should be indicated).

S.No.	Name Of Activity	List Of Tools And Plants With Quantity.

Date:

Signature :

Name :

Status :

Seal of the bidder Co. :

ANNEXURE-18**SOURCES OF MATERIALS TO BE ARRANGED BY THE CONTRACTOR FOR THE TRANSMISSION LINE (BEING TENDERED).**

S. No	Particulars	Approximate Quantity	Name Of The Firm From Which The Contractor Proposes To Procure The Material.
1.	Steel for Tower parts		
2.	Zinc for galvanisation		
3.	ACSR conductor		
4.	OPGW		
5.	Danger Board.		
6.	Cement		
7.	Number Plate.		
8.	Phase Plate.		
9.	Bolts & Nuts.		
10.	Spring Washers.		
11.	Packing Washers.		
12.	Anticlimbing Services.		
13.	Barbed Wires.		
14.	Galvanised Earthing Rod With Clamps.		
15.	Counter Poise Wire For Earthing.		
16.	Cement.		
17.	Reinforcement Steel.		
18.	Stringing Hardware		
19.	Disc Insulators 70KN & 160 KN		

Date:

Signature:

Name:

Status:

Seal of the bidder Co.:

ANNEXURE-19
DEVIATION FROM SPECIFICATION (COMMERCIAL)

The bidder shall state under this schedule, how his offer deviates, varies or departs from the CSPTCL's specification (commercial conditions) mentioned in this specification

S.No.	Subject	CSPTCL's specification clause reference & page	Proposed deviation by tenderer	Reasons for such deviations
1.	2.	3.	4.	5.

Date:

Signature :

Name :

Status :

Seal of the bidder Co. :

ANNEXURE-20
LITIGATION HISTORY OF THE BIDDER

Name of the bidder:

Bidder should provide information on any history of litigation or arbitration resulting from contracts executed in the last five years or currently under execution.

Year	Name of client, cause of litigation/ arbitration and matter in dispute	Details of Contract and Date	Award for or against bidder	Disputed amount (current value in Rs.)

Date
Place

SIGNATURE OF BIDDER
NAME
DESIGNATION
(SEAL)

ANNEXURE-21

QUALITY ASSURANCE PROGRAMME

The Bidder shall submit here complete details of Quality Assurance Programme required as per terms of the Specification.



Date:

Signature :

Name :

Designation :

Seal of tenderer:

Annexure-22

**UNDERTAKING TO BE SUBMITTED BY BIDDER REGARDING TOWER
MANUFACTURER**

We, M/s (bidder)..... do hereby undertake to fabricate, galvanize or outsource & to supplyMT ofKV Transmission line towers as per drawing and design of CSPTCL for the construction of Transmission line (name of line) of Chhattisgarh State Power Transmission Company Limited.

M/s.(Manufacturer).....are the manufacturer of galvanized transmission line towers, and if required we will out source MT quantity of Tower from M/s.....

The out sourcing of.....MT Tower will in no way affect the terms and conditions of the order including the completion period, Payment terms & Prices etc.

Date:

Place:

(1) Seal, address & Signature of Bidder

(2) Seal, address & Signature of Manufacturer

ANNEXURE -23
AGREEMENT (PROFORMA)

(To be executed on non judicial stamp paper worth Rs.300/- only with a revenue stamp of Rs. 1/- affixed on it)

This Agreement is made this _____ day of _____ between Shri _____ on behalf of the Contractor _____ (hereinafter called the Contractor which expression shall where the context so admits, be deemed to include his heirs, executors, administrators and representatives) of the one part, and the Chhattisgarh State Power Transmission Company Limited, Raipur being the Company constituted under Companies Act, 1956, (hereinafter called the CSPTCL which expression shall, where the context so admits, be deemed to include its successors in office and permitted assigns) of the other part.

WHEREAS in accordance with a Tender no. _____ dtd. _____ issued by Executive Director / Chief Engineer (P&P) of the CSPTCL, the Contractor submitted his tender dated _____ for construction of

All these works on turnkey basis more particularly described, mentioned, enumerated or referred to in the general conditions, specifications, schedules, drawings etc. forming part of tender, covering letters, schedule of prices and further correspondence, a copy of which is hereto annexed and is for purposes of identification signed by the contractor _____ on behalf of the contractor and Executive Director /Chief Engineer (P&P) of CSPTCL and all of which shall be deemed to form part of this agreement as though separately set out herein and are included in the expression "Contract" herein used (herein after referred to as the said works).

AND WHEREAS the CSPTCL has accepted the tender of the Contractor vide following separate work Orders which have been placed by CSPTCL for construction of aforesaid works on turnkey basis for the total net price of _____ upon the terms and subject to the condition hereinafter mentioned.

NOW THEREFORE THIS AGREEMENT WITNESSES AND IT IS hereby agreed as follows:

1. The contractor shall undertake following works :
 - (i) Supply of tower parts and all associated line accessories and complete erection of transmission line within the time specified in and in accordance with the terms and conditions specified in the CSPTCL aforesaid Work Orders.
2. The contractor shall commence the works described in the Notice Inviting Tender No. 02-04/NIT/TR-....., dated, namely, the construction of line , simultaneously and thereafter execute the works in parallel in accordance with the completion schedule submitted in the format set out in the Tender Specifications No. TR-....., read with the PERT Network / Bar Chart submitted in accordance with clause 3.05 of the tender. The Works shall be completed by the contractor on turnkey basis not later than **from the date of order.** In the event the contractor fails to undertake the Works in accordance with the Schedule, the contractor may be liable for penalty at the discretion of CSPTCL in terms of clause 2.06 of the tender .
3. In the event of a conflict or contradiction between: (a) any provision(s) in this agreement and any provision(s) in the Tender Specifications No. TR-....., i.e. the tender document, the provision(s) of this agreement shall prevail to the extent of such conflict, and (b) two or more provisions in the tender document, the provision(s) laying down more stringent obligations on the contractor shall prevail."
4. For the work done under the scope of the CSPTCL Work Orders referred above, the CSPTCL shall pay to the Contractor a total sum of Rs. _____ (In words Rupees

_____) or such other sum as may become payable in accordance with the said work order.

5. If at any time, any question, dispute or difference whatsoever arises between CSPTCL and the contractor upon, in relation with or in connection with this contract either party may forthwith give the other party a notice in writing of the existence of such question, dispute or difference and same shall be referred to the adjudication of three Arbitrators one to be nominated by CSPTCL, the other by the Contractor and third to be appointed by the two Arbitrators nominated by the parties at the commencement of arbitration proceedings and failing agreement between them, in accordance with the Arbitration and Conciliation Act 1996, the third Arbitrator so appointed shall act as the Presiding Arbitrator. The award so passed shall be binding on both the parties. The place of arbitration shall strictly be RAIPUR CG.
6. In all matters arising under out of or in relation with this agreement, the terms and conditions contained in the aforesaid Work Orders shall apply and all such matters shall be determined accordingly.
7. This agreement shall be deemed to be entered into at Raipur and all disputes and claims, if any, out of or in respect of this Agreement are to be settled at Raipur or be subject to jurisdiction of competent court situated in Chhattisgarh State.

IN WITNESS whereof the parties hereto have signed this agreement on the dates and year mentioned against their respective signature.

<p><u>Signature of Witness :</u></p> <p>1. Signature : _____ Address : _____</p> <p>Signature : _____ Address : _____</p> <p><u>Signature of Witnesses :</u></p> <p>1. _____</p> <p>2. _____</p>	<p><u>Name & Signature for Contractor</u></p> <p>Signature (On behalf of the Contractor)</p> <p>Name : _____</p> <p>Designation : _____</p> <p>Seal _____</p> <p>Signature (On behalf of CSPTCL)</p> <p>Name _____</p> <p>Designation _____</p>
--	--

ANNEXURE -24**PROFORMA FOR BANK GUARANTEE TOWARDS SECURITY DEPOSIT**

(To be executed on non-judicial stamp paper of Rs.300/- and Revenue stamp may be affixed on Bank Guarantee)

Bank Guarantee No..... Dtd.....

In consideration of the Chhattisgarh State Power Transmission Company Limited, Raipur (A successor company of Chhattisgarh State Electricity Board, Raipur hereinafter referred to as 'CSPTCL') having agreed to accept this Bank Guarantee in lieu of cash deposit by way of Security for due and faithful performance required from M/s. _____ (herein after referred to as "Contractors", the Bank of _____ hereby agrees unequivocally and unconditionally to pay within 48 hours on demand in writing from the Chhattisgarh State Power Transmission Company Limited or any officer authorized by it in this behalf of any amount upto _____ and not exceeding Rs.....(in _____ words) _____ only to the said Chhattisgarh State Power Transmission Company Limited on behalf of the aforesaid M/s _____ who have tendered and contracted for the supply of materials, equipments or services to the said the Chhattisgarh State Power Transmission Company Ltd, against order No..... dtd..... for the order value of Rs.....

The beneficiary of this Bank Guarantee shall be Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of CSEB Raipur). The proceeds / encashment of this Bank Guarantee would go in the name of Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of CSEB Raipur).

This agreement should be valid and binding on this bank up to and including _____ 2001 of for such further period as may hereunder be mutually fixed from time to time in writing by the Chhattisgarh State Power Transmission Company Ltd. and the contractor and shall not be terminable by notice or any change in the constitution of the aforesaid bank or the firm of Contractors or by any others reasons whatsoever and the Banker's liability hereunder shall not be impaired or discharged by any extn. of time or variations or alteration made, given conceded or agreed to with or without the Bank knowledge or consent by or between the Chhattisgarh State Power Transmission Company Ltd. and contractor in the existing and / or further tenders and / or contracts.

It is agreed by the Bank with the CSPTCL that if for any reason a dispute arises concerning the Bank's liability to pay the requisite amount to the CSPTCL under the terms of this guarantee the competent court at Raipur alone shall have the jurisdiction to determine the said dispute and that this shall be without prejudice to the liability of the Bank under the terms of this guarantee being unequivocal and unconditional as mentioned above.

The liability under this guarantee is restricted to Rs..... (In words) _____ only. This guarantee shall remain in force until _____ Unless a demand to enforce a claim under the guarantee is made under this Bank Guarantee by the CSPTCL to the Bank within six months from that date the rights of the Chhattisgarh State Power Transmission Company Ltd under this guarantee shall be forfeited and Bank shall be relieved and discharged from all liabilities thereunder.

WITNESSES:-

SIGNATURES

Authorized Signatories of Bank

1. Signed. _____
2. for _____ Bank

ANNEXURE -25

PROFORMA FOR BANK GUARANTEE TOWARDS PERFORMANCE

(To be executed on non-judicial stamp paper of Rs.300/- and Revenue stamp may be affixed on Bank Guarantee)

Bank Guarantee No..... Dtd.....

In consideration of the Chhattisgarh State Power Transmission Company Limited, Raipur (A successor company of Chhattisgarh State Electricity Board, Raipur hereinafter referred to as ‘CSPTCL’) having agreed to accept this Bank Guarantee in lieu of cash deposit by way of Security for due and faithful performance required from M/s. _____ (herein after referred to as “Contractors”, the Bank of _____ hereby agrees unequivocally and unconditionally to pay within 48 hours on demand in writing from the Chhattisgarh State Power Transmission Company Limited or any officer authorized by it in this behalf of any amount up to and not exceeding Rs.....(in words)

..... only to the said Chhattisgarh State Power Transmission Company Limited on behalf of the aforesaid M/s who have tendered and contracted for the supply of materials, equipments or services to the said the Chhattisgarh State Power Transmission Company Ltd, against order No..... dtd..... for the order value of Rs.....

The beneficiary of this Bank Guarantee shall be Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of CSEB Raipur). The proceeds / encashment of this Bank Guarantee would go in the name of Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of CSEB Raipur).

This agreement should be valid and binding on this bank up to and including _____ 2001 of for such further period as may hereunder be mutually fixed from time to time in writing by the Chhattisgarh State Transmission Company Ltd. and the contractor and shall not be terminable by notice or any change in the constitution of the aforesaid bank or the firm of Contractors or by any others reasons whatsoever and the Banker’s liability hereunder shall not be impaired or discharged by any extn. of time or variations or alteration made, given conceded or agreed to with or without the Bank knowledge or consent by or between the Chhattisgarh State Power Transmission Company Ltd. and contractor in the existing and / or further tenders and / or contracts.

It is agreed by the Bank with the CSPTCL that if for any reason a dispute arises concerning the Bank’s liability to pay the requisite amount to the CSPTCL under the terms of this guarantee the competent court at Raipur alone shall have the jurisdiction to determine the said dispute and that this shall be without prejudice to the liability of the Bank under the terms of this guarantee being unequivocal and unconditional as mentioned above.

The liability under this guarantee is restricted to Rs..... (In words).....only. This guarantee shall remain in force until Unless a demand to enforce a claim under the guarantee is made under this Bank Guarantee by the CSPTCL to the Bank within six months from that date the rights of the Chhattisgarh State Power Transmission Company Ltd under this guarantee shall be forfeited and Bank shall be relieved and discharged from all liabilities thereunder.

WITNESSES:-

SIGNATURES

Authorized Signatories of Bank

1. Signed. _____

2. for _____ Bank

ANNEXURE -26
Proforma for Indemnity Bond

(To be executed on non-judicial stamp paper worth Rs.300/- with a revenue stamp worth Rs.1/- affixed thereon).

THIS INDEMNITY BOND is made thisday of20.....By M/s., a company registered under the Companies Act (hereinafter called as 'Contractor' or 'Obligator' which expression shall include its successors and permitted assigns) in favour of Chhattisgarh State Power Transmission Company Limited, Raipur being the Company constituted under Companies Act, 1956, (hereinafter called the CSPTCL) and its project for supply of towers & other line materials and complete erection of(hereinafter called "Employer" which expression shall include its successors and assigns):

WHEREAS EMPLOYER has awarded to the 'Contractor' a Contract for supply of towers & other line materials and complete erection oftransmission line vide Order No..... DTD..... and Amendment No.....(applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which Employer is required to hand over various Material to the 'Contractor' for execution of the Contract.

And WHEREAS by virtue of Clause No..... of tender specification No....., the 'Contractor' is required to execute an Indemnity Bond in favour of Employer for the Material handed over to it by Employer for the purpose of performance of the Contract/Erection portion of the Contract (hereinafter called the 'Materials').

Now THEREFORE, This Indemnity Bond witnessed as follows:

1. That in consideration of various Material like Galvanised tower parts, Disc Insulators, Stringing Hardware, ACSR Conductor & OPGW as mentioned in the Supply Order No..... dtd. at clause No....., Valued at (Amount in figures) Rs..... (amount in words) (Rupees) handed over to the 'Contractor' in instalments from time to time for the purpose of performance of the Contract, the 'Contractor' hereby undertakes to indemnify and shall keep Employer indemnified for the full value of the Material. The 'Contractor' hereby acknowledges receipt of the initial instalment of the Material as per details in the schedule appended hereto. Further, the 'Contractor' agrees to acknowledge receipt of the subsequent instalments of the Material as required by Employer in the form of Schedules consecutively numbered which shall be attached to this Indemnity Bond so as to form integral parts of this Bond. It is expressly understood by the 'Contractor' that handing over of the dispatch title documents in respect of the said Materials duly endorsed by Employer in favour of the 'Contractor' shall be construed as handing over of the Material purposed to be covered by such title documents and the 'Contractor' shall hold such Material in trust as a Trustee for an on behalf of Employer.
2. That the 'Contractor' is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Material at Employer project Site against all risks whatsoever till the Material are duly used/erected in accordance with the terms of the Contract and the Plant/Package duly erected and commissioned in accordance with the terms of the Contract, is taken over the Employer. The 'Contractor' undertakes to keep Employer harmless against any loss or damage that may be caused to the Material.
3. The 'Contractor' undertakes that the Material shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the Material shall be utilized for any other work or purpose whatsoever. It is clearly

understood by the ‘Contractor’ that non-observance of the obligations under this Indemnity Bond by the ‘Contractor’ shall interalia constitute a criminal breach of trust on the part of the ‘Contractor’ for all intents and purpose including legal/penal consequences.

4. That Employer is and shall remain the exclusive Purchaser of the Material free from all encumbrances, charges or liens of any kind, whatsoever. The Material shall at all times be open to inspection and checking by the Purchaser’s Representative or other employees/Agents authorized in this regard. Further, Employer shall always be free at all times to take possession of the Materials in whatever form the Materials may be, if in its opinion , the Materials are likely to be endangered, misutilized or converted to uses other than those specified in the contract by any acts of omission or commission on the part of the ‘Contractor’ or any other person or on account of any reason whatsoever and the ‘Contractor’ binds himself and undertakes to comply with the directions of demand of EMPLOYER to return the Material without any demur or reservation.
5. That this Indemnity Bond is irrevocable. If at any time any loss or damage occurs to the Material or the same or any part thereof is misutilized in any manner whatsoever, then the ‘Contractor’ hereby agrees that the decision of the Purchaser’s Representative as to assessment of loss or damage to the Material shall be final and binding on the ‘Contractor’. The ‘Contractor’ binds itself and undertakes to replace the lost and/or damaged Material at its own cost and/or shall pay the amount of loss to Employer without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to Employer against the ‘Contractor’ under the Contract and under this Indemnity Bond.
6. NOW THE CONDITION of this Bond is that if the ‘Contractor’ shall duly and punctually comply with the terms and conditions of this Bond to the satisfaction of Employer, THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREOF, the ‘Contractor’ has hereunto set its hand through its authorized representative under the common seal of the Company, the day, month and year first above mentioned.

For and on behalf of

M/s. _____

WITNESS

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. 1. Signature 2. Name 3. Address | Signature.....
Name
Designation
Authorized representative |
| <ol style="list-style-type: none"> 2. 1. Signature 2. Name <p style="text-align: center;">(Common Seal)</p> | |
| <ol style="list-style-type: none"> 3. Address <p style="text-align: center;">(In case of Company)</p> | |

* Indemnity Bonds are to be executed by the authorized person having the Power of Attorney issued under common seal of the company with authority to execute Indemnity Bonds. The Original Power of Attorney if it is specifically for this Contract or a Photostat copy of the Power of Attorney if it is General Power of Attorney and such documents should be attached to Indemnity Bond.

ANNEXURE-27

PRICE VARIATION CLAUSE FOR FABRICATED AND GALVANIZED TRANSMISSION LINE TOWER

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and index numbers, the price payable shall be subject to adjustment, up or down in accordance with the following formula :-

Transmission line tower with both heavy and light angles :

$$P = P_0/100 \{ 11+32 (SBLR/SBLR_0) + 25 (SBIR/SBIR_0) + 09 (Zn/Zn_0)+23 (W/W_0) \}$$

Wherein:

P = Price payable as adjusted in accordance with the above formula.

P₀ = Price quoted/confirmed

SBLR₀ = Price of Steel Blooms- Retail (refer notes)

This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.

SBIR₀ = Price of Steel Billets- Retail (refer notes)

This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.

Zn₀ = Price of electrolytic high grade zinc (refer notes).

This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.

W₀ = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 2001 = 100) (Refer notes).

This index number is as applicable on the first working day of the month, three months prior to the date of tendering.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC) TLT/ 2014/_/_one month prior to the date of tendering.

SBLR = Price of Steel Blooms-Retail (refer notes)

This price is as applicable on the 1st working day of the month, two months prior to the date of delivery.

SBIR = Price of Steel Billets-Retail (refer notes)

This price is as applicable on the 1st working day of the month, two months prior to the date of delivery.

Zn = Price of electrolytic high grade zinc (refer notes).

This price is as applicable on the 1st working day of the month, two months prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base 2001 = 100) (Refer notes).

This index number is as applicable on the first working day of the month, four months prior to the date of delivery.

The "date of delivery" is the date on which transmission line towers are notified as being ready for inspection/dispatch. (In the absence of such notification the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

NOTES :

- (a) All prices of raw materials are exclusive of modvatable excise/CV duty amount and exclusive of any other central, state or local taxes, octroi etc.
- (b) All prices are as on first working day of the month.
- (c) The details of prices are as under:-
 - i. The price of Steel Bloom-Retail are the average Retail price of Blooms of size 150x150mm of all cities in Rs./MT; as published by Joint Plant Committee (JPC) Kolkata. Heavy angles of size above 110mm x110mm are deemed to be related to this price.
 - ii. The price of Steel Billets-Retail are the average Retail price of Billets of size 100mm of all cities in Rs./MT; as published by Joint Plant Committee (JPC) Kolkata. Light angles of size below & including 110mm x110mm are deemed to be related to this price.
 - iii. The price of electrolytic high grade zinc (in Rs./MT) is ex-works price as quoted by a primary producer.
 - iv. Cost weightage of re-rolling / conversion charges is included in Labour cost weightage (W).

ANNEXURE-28
PRICE VARIATION FORMULAE FOR AAC/AAAC/ACSR CONDUCTORS

The price quoted/confirmed for Aluminium Conductor is based on the input cost of raw materials as on the date of quotation. It is deemed to be related to the prices of raw materials, as specified in the price variation clauses given below. In case of any variation in these prices, the prices payable shall be subject to adjustment up or down in accordance with the following formulae.

1. AAC/AAAC Conductors

$$P = P_o + WA(AL - AL_o)$$

2. ACSR Conductors

$$P = P_o + WA(AL - AL_o) + WF (FE - FE_o)$$

Wherein,

P = Ex-works price payable in Rs. per km as adjusted in accordance with the price variation clause.

P_o = Ex-works price quoted/confirmed in Rs. per km.

WA = Weight of Aluminium in AAC/AAAC/ACSR Conductor in MT per km. as per the type of conductor (Refer the enclosed table – A giving this factor for various types of conductors)

AL_o = Price of Daily LME Cash SELLER Settlement price of Aluminium
 This price is applicable prevailing as on 30 days prior to the date of tender opening.

WF = Weight of Steel Content in ACSR Conductor in MT per km as per the type of conductor (Refer the enclosed table-A giving this factor for various types of conductors).

FE_o = Price of High Tensile Galvanized Steel Wire in Rs./MT of appropriate size.
 This price is applicable prevailing as on the 30 days prior to the date of tender opening.

For example, if tender is opened on 31st October 2014, the applicable raw material prices (AL_o and FE_o) would be those, prevailing as on the 1st day of October 2014.

AL = Price of Daily LME Cash SELLER Settlement price of Aluminium
 This price is applicable prevailing as on 30 days prior to the date of delivery.

FE = Price of High Tensile Galvanized Steel Wire in Rs./MT of appropriate size.
 This price is applicable prevailing as on the 30 days prior to the date of delivery.

For example, if the date of delivery is 31st December 2014, the applicable raw material prices (AL and FE) would be those prevailing as on the 1st day of December 2014.

The above prices and indices are as published by IEEMA vide circular reference IEEMA(PVC)/AL Conductor-LME/-

The date of delivery is the date on which the Conductor is notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes:

1. All domestic prices of raw materials applicable to excise duty units are exclusive of modvatable excise/CV duty amount and exclusive of any other central, state or local taxes, octroi etc.
2. Price of Daily LME Cash SELLER Settlement price of Primary Aluminium in US\$ per MT is as published by London Metal Bulletin (LME). Premium for Aluminium Ingot in US\$ per MT is added in this Daily LME price and converted in Indian Rs./MT using exchange rate and adding appropriate customs duty.

Monthly price circular will contain daily prices of Aluminium during the month as announced by LME.

3. The price of High tensile Galvanized Steel Wire (in Rs./MT) for different sizes in mm is the price as quoted by a primary producer; which is normally valid for the entire month. Further revisions in prices; if any; as quoted by the primary producer will also be published.

TABLE-A

WEIGHT FACTOS FOR VARIOUS TPES OF CONDUCTORS AS PER IS:398

Sr. No.	Conductor types	A/AA Strands	Steel strands	Aluminium Grade/Alloy kg/km	HTGS Steel kg/km	Total kg/km
1	ACSR Panther	30/3	7/3	586	388	974
2	ACSR Zebra	54/3.18	7/3.18	1185	436	1621
3	ACSR Moose	54/3.53	7/3.53	1465	539	2004
4	AAAC Panther	19/3.94	0	636.67	0	636.67
5	AAAC Zebra	37/4	0	1280.5	0	1280.5
6	AAAC Moose	61/3.45	0	1573.71	0	1573.71

ANNEXURE - 29**FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT/
FACILITIES****BANK CERTIFICATE**

This is to certify that M/s..... (insert Name & address of the Contractor) who have submitted their bid to (insert name of the Employer) against their tender specification vide ref No. for (insert name of the package alongwith the project name) is our customer for the past years.

Their financial transaction with our Bank have been satisfactory. They enjoy the following fund based and non fund based limits including for guarantees, L/C and other credit facilities with us against which the extent of utilization as on date is also indicated below:

Sl.No.	Type of Facility	Sanctioned Limit as on Date	Utilisaion as on Date

This letter is issued at the request of M/s

Signature.....
Name of Bank
Name of Authorised Signatory.....
Designation.....
Phone No.....
Address.....
Email address

SEAL OF THE BANK

ANNEXURE - 30

(Proforma for Deed of Extn. of Bank Guarantee)

(To be executed on N.J. Stamp Rs. 300/-+One Revenue Stamp worth Rs. 1/-)

Extn. Deed No.-----

Date-----

B.G. No. -----Date-----

C.S. Power Transmission Company Ltd.

Sub:- The Extn. of Bank Guarantee No. -----dated----for the Rs.-- -----
----- Favours your self expiring on -----.

- 1) At the request of our client M/s -----we hereby extend our Guarantee No.-----dt.-----given on their behalf for the further period from-----to -----.
- 2) The Word CSEB wherever referred in the Bank Guarantee shall be replaced by CSPTCL (A Successor Company of CSEB, hereinafter referred to as CSPTCL).The beneficiary of this Bank Guarantee shall be CSPTCL (A Successor Company of CSEB).
- 3) Our liability under this guarantee is restricted to Rs. ----- (Rupees -----). This guarantee shall remain in force upto ----- Unless a demand to enforce a claim is made under this Bank Guarantee by the CSPTCL to the Bank within six months from the date i.e. up to -----the rights of the CSPTCL under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liability there under.

Witness:-

Signed for Bank

1)

2)

ANNEXURE-31
PRE-CONTRACT INTEGRITY PACT

1. GENERAL

- 1.1 This pre-bid contract Agreement (herein called the Integrity Pact) is made on.....day of the month20..., between the CSPTCL acting through Shri.....ED/CE (P&P), CSPTCL (hereinafter called the “BUYER”, which expression shall mean and include, unless the context otherwise requires, his successors in the office and assigns) and the First Party, proposes to procure (name of the Stores/Equipment/Work/Service) and M/s.....represented by Shri..... Chief Executive Officer (hereinafter called the “BIDDER/Seller”, which expression shall mean and include, unless the context otherwise requires, his successors an permitted assigns) and the Second Party, is willing to offer/has offered.
- 1.2 WHEREAS the BIDDER is a Private Company/Public Company/ Government undertaking / Partnership / Registered Export Agency, constituted in accordance with the relevant law in the matter and the BUYER is a Ministry/Department of the Government, performing its function on behalf of the CSPTCL.

2. OBJECTIVES

NOW, THEREFORE, the BUYER and the BIDDER agree to enter into this pre-contract agreement, hereinafter referred to as Integrity Pact, to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the Contract to be entered into with a view to:-

2.1. Enabling the BUYER to obtain the desired Stores/Equipment/Work/Service at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and 2.2. Enabling BIDDERS to abstain from bribing or indulging in any corrupt practices in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing any corrupt practices and the BUYER will commit to prevent corruption, in any form, by its official by following transparent procedures.

3. COMMITMENTS OF THE BUYER

The BUYER commits itself to the following:-

- 3.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with the contract, will demand, take promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting of implementation process related to contract.
- 3.2 The BUYER will, during the pre-contract stage, treat BIDDERS alike, and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to the other BIDDERS.
- 3.3 All the officials of the BUYER will report the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

In case any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the BUYER with the full and verifiable facts and the same prima facie found to

be correct by the BUYER, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the BUYER the proceedings under the contract would not be stalled.

4. COMMITMENTS OF BIDDERS

The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following:-

- 4.1. The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.
- 4.2. The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage, or inducement to any official of the BUYER or otherwise in procuring the Contract of forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with the CSPTCL for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with the CSPTCL.
- 4.3. The BIDDER further confirms and declares to the BUYER that the BIDDER in the original Manufacture/Integrator/Authorized government sponsored export entity of the stores and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its functionaries, whether officially or unofficially to the award of the contract to the BIDDER, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- 4.4. The BIDDER, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payment he has made, is committed to or intends to make to officials of the BUYER or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.
- 4.5. The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- 4.6. The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- 4.7. The BIDDER shall not use improperly, for purpose of competition or personal gain, or pass on to others, any information provided by the BUYER as part of the business relationship, regarding plans, technical proposal and business details, including information contained in

any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.

- 4.8. The BIDDER commits to refrain from giving any compliant directly or through any other manner without supporting it with full and verifiable facts.
- 4.9. The BIDDER shall not instigate or cause to instigate any third person to commit any of the acts mentioned above.

5. PREVIOUS TRANSGRESSION

- 5.1. The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDER's exclusion from the tender process.
- 5.2. If the BIDDER makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

6. EARNEST MONEY / SECURITY DEPOSIT

- 6.1. Every BIDDER while submitting commercial bid, shall deposit an amount as specified in RFP as Earnest Money/Security Deposit, with the BUYER through any of the following instruments:
- (i) Bank Draft or a Pay Order in favour of.....
 - (ii) A confirmed guarantee by an Indian Nationalised Bank, promising payment of the guarantee sum to the(BUYER).....on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the BUYER shall be treated as conclusive proof of payment.
 - (iii) Any other mode or through any other instrument (to be specified in the RFP).
- 6.2. The Security Deposit shall be valid up to a period till complete conclusion of the contractual obligations to the complete satisfaction of both the BIDDER and BUYER, including warranty period.
- 6.3. In the case of successful BIDDER a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of Sanctions for violation shall be applicable for forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.
- 6.4. No interest shall be payable by the BUYER to the BIDDER on Earnest Money/Security Deposit for the period of its currency.

7. SANCTIONS FOR VIOLATIONS

- 7.1. Any breach of the aforesaid provisions by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle the BUYER to take all or any one of the following actions, wherever required:-
- (i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the BIDDER. However, the proceedings with the other BIDDER(s) would continue.

- (ii) To forfeit fully or partially the Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed), as decided by the BUYER and the BUYER shall not be required to assign any reason therefore.
- (iii) To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER.
- (iv) To recover all sums already paid by the BUYER, and in case of the Indian BIDDER with interest thereon at 2% higher than the prevailing Prime Lending Rate while in case of a BIDDER from a country other than India with Interest thereon 2% higher than the LIBOR. If any outstanding payment is due to the BIDDER from the BUYER in connection with any other contract such outstanding payment could also be utilized to recover the aforesaid sum and interest.
- (v) To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the BIDDER , in order to recover the payments, already made by the BUYER, along with interest.
- (vi) To cancel all or any other contracts with the BIDDER and the BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancellation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.
- (vii) To debar the BIDDER from participating in future bidding processes of the CSPTCL for a minimum period of five years, which may be further extended at the discretion of the BUYER.
- (viii) To recover all sums paid in violation of this Pact by BIDDER(s) to any middlemen or agent or broken with a view to securing the contract.
- (ix) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the BUYER with the BIDDER, the same shall not be opened.
- (x) If the BIDDER or any employee of the BIDDER or any person action on behalf of the BIDDER, either directly or indirectly, is closely related to any of the officers of the BUYER, or alternatively, if any close relative of an officer of the BUYER has financial interest/stake in the BIDDER's firm, the same shall be disclosed by the BIDDER at the time of filling of tender. Any failure to disclose the interest involved shall entitle the BUYER to rescind the contract without payment of any compensation to the BIDDER.

The term "close relative" for this purpose would mean spouse whether residing with the Government servant or not, but not include a spouse separated from the Government servant by a decree or order of a competent court; son or daughter or step son or step daughter and wholly dependent upon Government servant, but does not include a child or step child who is no longer in any way dependent upon the Government servant or of whose custody the Government servant has been deprived of by or under any law; any other person related, whether by blood or marriage, to the Government servant or to the Government servant's wife or husband and wholly dependent upon Government servant.

- (xi) The BIDDER shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the BUYER, and if he does so, the BUYER shall be entitled forthwith to rescind the contract and all other contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.

- 7.2. The decision of the BUYER to the effect that a breach of the provisions of this pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the Monitor(s) appointed for the purpose of this Pact.

8. INDEPENDENT MONITORS

- 8.1. The BUYER will appoint Independent Monitors (hereinafter referred to as Monitors) for this Pact.
- 8.2. The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.
- 8.3. The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.
- 8.4. Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings. The Monitor shall be under contractual obligation to treat the information and documents of the BIDDER/Subcontractor(s) with confidentiality.
- 8.5. As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the BUYER.
- 8.6. The Monitor will be submit a written report to the designated authority of BUYER/Secretary in the department/within 8 to 10 weeks from the date of reference or intimation to him by the BUYER /BIDDER and, should the occasion arise, submit proposal for correcting problematic situation.

09. FACILITATION OF INVESTIGATION

In case of any allegation of violation of any provision of this fact or payment of commission, the BUYER or its agency shall be entitled to examine all the documents including the books of Account of the BIDDER and the BIDDER shall provide necessary information of the relevant documents and shall extend all possible help for the purpose of such examination.

10. LAW AND PLACE OF JURISDICTION

This pact is subject to Indian Law, the place of performance and jurisdiction shall be the seat of the BUYER.

11. OTHER LEGAL ACTIONS

The actions stipulated in this integrity Pact are without prejudice to any other legal action that may following in accordance with the provisions of the any other law in force relating to any civil are criminal proceeding.

12. VALIDITY

- 12.1 The validity of this integrity Pact shall be from the date of its signing and extend up to 2 years or the complete execution of the contract to the satisfaction of both the BUYER and the BIDDER/Seller whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.
- 12.2. If one or several provision of this pact turn out to be invalid; the remainder of this pact shall remain valid. In such case, the parties will strive to come to an agreement to their original intention.
13. The parties hereby sign this Integrity Pact aton.....

BUYER
ED/CE(P&P)
CSPTCL, Raipur

BIDDER
CHIEF EXECUTIVE OFFICER
Department/PSU

ANNEXURE A-32(a)
CHECK LIST
(To be kept in Envelope-II)

S. No.	Items	Reference	Declaration (Strike-out whichever is not applicable)	Page No.
1.	Duly & properly filled Questionnaire	Annexure A-10	Yes/No	
2.	(a) Declaration regarding sharing of land border with India	Annexure-43	Yes/No	
3.	(b) Registration certificate issued by competent authority (In case, the sole bidder /any partner of Joint Venture/consortium is from a country which shares a land border with India, as defined in Ministry of Finance, Govt. of India vide order no. F. No. 6/18/2019-PPD dated 23.07.2020)		Yes/No	
4.	Self-attested copies of audited balance sheets and profit & loss account statement of sole bidder/each partner of JV for last 5 financial years (i.e., FY 2015-16 to FY 2019-20).	--	Yes/No	
5.	A Self-attested certificate issued by chartered accountant showing 'Annual Turnover' for the last five financial years (FY 2015-16, 2016-17, 2017-18, 2018-19 & 2019-20) & 'Net worth' including assets and liability of the sole bidder/each partner of JV for the last three financial years (FY 2017-18, 2018-19 & 2019-20)	--	Yes/No	
6.	A Self-attested certificate of Chartered Accountant (in original) indicating details (break-up) of available 'Liquid assets' (LA) for sole bidder/each partner of JV. Such certificate should have been issued not earlier than 3 months prior to the date of bid opening.	--	Yes/No	
7.	Evidence of access to or availability of credit/facilities	Annexure-A-29	Yes/No	
8.	Certificate issued by Chartered Accountant (To be furnished for Sole bidder/Lead Partner as well as other Partner of JV)	Annexure A-39	Yes/No	
9.	Declaration by the bidder (To be furnished for Sole bidder/Lead Partner as well as other Partner of JV (Separately).	Annexure A-38	Yes/No	
10.	Self attested detailed order copy along with annexure containing BoQ/ scope of work in support of technical experience criteria of PQR for having constructed & commissioned required route length of transmission line on turnkey basis during last 5 years (between 1st Apl'2015 & 31st March'2020) against order issued by Power utilities owned and controlled by Central or State Govt. or PSUs or Govt. organizations. <u>The date of order should not be older than 7 years from the date of issue of NIT of the instant tender.</u>	--	Yes/No	

11.	Self attested copy of Performance certificate for successful commissioning & satisfactory operation of above mentioned transmission lines for a period of one year (from the date of commissioning) indicating date of commencement of work and its commissioning (constructed by sole bidder / any of the partners) as on date of NIT of the instant tender.	--	Yes/No	
12.	Copy of Valid 'A' class Electrical Contractor License issued by CG anugyapanMandal/ CG state licensing board in the name of sole bidder / lead partner of the joint venture/ consortium or an undertaking to submit 'A' class electrical contractor license issued by C.G. AnugyapanMandal / CG State licensing Board within 30 days after issue of LOA, by the sole bidder or lead partner of the JV/consortium.	--	Yes/No	
13.	Copy of EPF code number/ EPF registration No. allotted by EPF Commissioner in the name of the sole bidder / Lead partner of the JV	--	Yes/No	
14.	Pre-contract Integrity pact in prescribed format	Annexure A-31	Yes/No	
15.	Deviation from technical specification/ conditions	Annexure A-9	Yes/No	
16.	Deviation from the commercial condition of contract	Annexure A-19	Yes/No	
17.	Undertaking by the Joint Venture Partners	Annexure A-36	Yes/No	
18.	Power of Attorney for Joint Venture	Annexure A-37	Yes/No	
19.	Undertaking for Personnel Capabilities (To be furnished for Sole bidder/Lead Partner as well as other Partner of JV) (<i>Separately</i>)	Annexure A-40	Yes/No	
20.	Undertaking for Equipment Capabilities (To be furnished for Sole bidder/Lead Partner as well as other Partner of JV) (<i>Separately</i>)	Annexure A-41	Yes/No	
21.	Power of attorney issued to legally authorised signatory	--	Yes/No	
22.	Litigation History of the Bidder (To be furnished for Sole bidder/Lead Partner as well as other Partner of JV) (<i>Separately</i>)	Annexure A-20	Yes/No	
23.	Details of plant & manufacturing capacity	Annexure-14	Yes/ No.	
24.	Experience in fabrication and supply of towers. (information shall be given in respect of 220 KV DCSS/DCDS & above	Annexure-15	Yes/ No.	
25.	Experience in erection of 220 KV & above transmission lines on turnkey with supply of all material (completed works, which are in successful operation for a period of not less than 01 years).	Annexure-16	Yes/ No.	
26.	Undertaking to be submitted by bidder regarding Tower manufacturer	Annexure-22	Yes/No	
27.	Proforma for Joint Deed of Undertaking by the Tower Manufacturer	Annexure-34	Yes/ No	

Date

Place

SIGNATURE OF BIDDER
NAME
DESIGNATION
(SEAL)

Please note that in case of any of the required document is not submitted along with the bid, the bid will be rejected without any further correspondence in the matter.

Annexure – 32(b)
CHECK LIST (To be submitted with bid)

S.No	ITEMS	REFERENCE	DECLARATION Strike out whichever is not applicable	Page No.
	Earnest money enclosed	Covering letter	Yes / No	
1	Financial data for previous 5 years	Annexure-1	Yes/No	
2	Average annual turnover	Annexure-2	Yes / No	
3	List of Sub-vendors	Annexure-3	Yes / No	
4	Current contract commitments	Annexure-4	Yes / No	
5	Declaration form	Annexure-5	Yes / No	
6	Scope of work of soil investigation	Annexure-6	Yes / No	
7	List of stringing equipment available with the contractor	Annexure-7	Yes / No	
8	Completion schedule	Annexure-8	Yes / No	
9	Questionnaire	Annexure-10	Yes / No	
10	Standards / codes	Annexure-11	Yes / No	
11	List of Drawing	Annexure-12	Yes / No	
12	Details of headquarters & field organization of the bidder	Annexure-13	Yes / No	
13	List of tools and plants required for construction of line, to be arranged by the contractor	Annexure-17	Yes/ No.	
14	Sources of materials to be arranged by the contractor for the transmission line (being tendered).	Annexure-18	Yes/ No.	
15	Quality assurance programme	Annexure-21	Yes/ No.	

Date
Place

SIGNATURE OF BIDDER
NAME
DESIGNATION
(SEAL)

ANNEXURE-33**(Only for illustration, not to be filled by bidder)**

ILLUSTRATION OF CRITERIA FOR PRICE BID EVALUATION (Tender No.TR-20/13)				
Construction of 220KV DCDS line from 400/220 KV S/s. Kurud to proposed 220/132 KV S/s. Patan, Distt- Durg(C.G.) on turnkey basis(length 24 Km.)				
S.No	PARTICULARS	Name of bidder		
		M/s.....	M/s.....	M/s.....
1	Cost of supply of materials as per Schedule A-1 (including all taxes , duties &cess)			
2	Cost of construction charges as per Schedule-A-2 (including all taxes &cess)			
3	TOTAL AMOUNT (Sch-A-1 & Sch.A-2) (including all taxes) (1+2) :-			
4	Rebate / discount offered, if any			
5	Total Project Cost after Rebate (3-4) :-			
6	Position of bidder			

ANNEXURE -34**Proforma for Joint Deed of Undertaking by the Tower Manufacturer along with the Bidder / Contractor**

(To be executed on non-judicial stamp paper worth Rs.300/- with a revenue stamp worth Rs.1/- affixed thereon).

THIS DEED OF UNDERTAKING executed thisday of20.....By M/s., a company incorporated under the laws of Companies Act, 1956 and having its Registered Office at (hereinafter called the "Tower Manufacturer" which expression shall include its successors, executors and permitted assigns.), and M/s..... a company incorporated under the laws of India having its Registered Office at (hereinafter called the "Bidder"/ "Contractor" which expression shall include its successors, executors and permitted assigns.) in favour of Chhattisgarh State Power Transmission Co. Ltd., a Company incorporated under the Companies Act, 1956 having its registered office at SLDC Building, Dangania, Raipur-492013 (C.G.) (hereinafter called the "Employer" which expression shall include its successors and assigns).

WHEREAS the "EMPLOYER" invited Tender as per its Specification No..... for on turnkey basis.

AND WHEREAS Clause No..... Qualifying requirements as on the date of tender opening, Sub Section (III) technical Experience, Section (ii) (Manufacturing facilities), forming part of the Bidding Documents inter-alia stipulates that the Bidder and/or Manufacturer must fulfil the Qualifying Requirements and be jointly and severally bound and responsible for the quality and timely supply of tower parts in the event the Bid submitted by the Bidder is accepted by the Employer resulting in a Contract.

AND WHEREAS the Bidder has submitted its Bid to the Employer vide Proposal No..... dtd..... based on tie-up with the Tower Manufacturer for supply of tower parts.

NOW THEREFORE THIS UNDERTAKING WITNESSED asunder:-

1.0 In consideration of the award of Contract by the Employer to the Bidder (hereinafter referred to as the "Contract") we, the Tower Manufacturer and the Bidder/Contractor do hereby declare that we shall be jointly and severally bound unto the Chhattisgarh State Power Transmission Co. Ltd., for the manufacturer, testing, supply of tower parts on FOR destination delivery at site basis in accordance with the Contract Specification.

2.0 Without in any way affecting the generality and total responsibility in terms of this Deed of Undertaking, the Tower Manufacturer hereby agrees to depute their representatives from time to time to the Employer's Project site as mutually considered necessary by the Employer, Bidder/Contractor and the Tower Manufacturer to ensure proper quality, manufacturer, testing and supply on FOR destination delivery at site basis and successful performance of the material in accordance with Contract Specifications. Further, if the Employer suffers any loss or damage on account of non-performance of the material (tower parts) fully meeting the performance guaranteed as per Bid Specification in terms of the contract. We the Tower Manufacturer and the Contractor jointly and severally undertake to pay such loss or damages to the Employer on its demand without any demur.

3.0 This deed of Undertaking shall be construed and interpreted in accordance with the laws of India and Courts in Raipur shall have exclusive jurisdiction in all matters arising under the Undertaking.

4.0 We, the Tower Manufacturer/bidder/Contractor agree that this Undertaking shall be irrevocable and shall form an integral part of the Contract and further agree that this Undertaking shall continue to the enforceable till the Employer discharges it. It shall become operative from the effective date of Contract.

IN WITNESS WHEREOF, the 'Tower Manufacturer and/or the Bidder/Contractor have through their Authorized Representatives executed these presents and affixed Common seals of their respective Companies, on the day, month and year first above mentioned.

(For Tower Manufacturer)

M/s. _____

WITNESS

- 1. 1. Signature
- 2. Name
- 3. Address

- Signature.....
- Name
- Designation

(Common Seal of Company)

(For Bidder)

M/s _____

- 2. 1. Signature
- 2. Name
- 3. Address

- Signature
- Name
- Designation.....

(Common Seal of Company)

ANNEXURE – 35**PROFORMA FOR BANK GUARANTEE FOR LOSS/DAMAGE TO CSPTCL**

NOTE FOR BIDDERS: (Not to be typed in the Bank Guarantee) To be furnished in non-judicial stamp paper of Rs.300/- applicable as per MP/ Chhattisgarh Duty Act from any Nationalised /Scheduled Bank.

In consideration of the Chhattisgarh State Power Transmission Company Limited, (herein after called “CSPTCL”) having agreed to exempt Ms. _____ (herein after called “the said Contractors”) from the demand under the terms and conditions of an agreement No. _____ Dated _____ made between _____ And _____ for _____ (herein after called “the said agreement”) of security deposit for satisfactory performance of materials (as detailed in the said agreement) and for the due fulfilment by the said Contractor(s) of the terms and conditions contained in the said agreement, on production of a Bank Guarantee for Rs. _____ (Rs. _____ Only).

1. We _____ Bank (herein after referred to as “the Bank”) at the request of _____ contractor(s) do hereby undertake unequivocally and unconditionally to pay to CSPTCL, an amount not exceeding Rs. _____ (Rs. _____ Only) against any loss or damage caused to or suffered or would be caused to or suffered or would be caused to or suffered by CSPTCL by reason of any breach by the said Contractors(s) of any of the terms or conditions contained in the said agreement.
2. We _____ (indicate the name of the bank) Bank do hereby undertake to pay the amounts due and payable under this guarantee without any demer, merely on a demand from CSPTCL stating that the amount claimed is due by way of loss or damage caused to or would cause to or suffered by CSPTCL by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said agreement or by reasons of the Contractor(s).
3. We, the _____ (indicate the name of the bank) do hereby further undertake unequivocally and unconditionally pay the amount due and payable under this Guarantee without demer, merely on demand from CSPTCL stating that the amount claimed is due by was of loss or damage caused to or would be caused to or suffered by CSPTCL by reason of each breach by the said Contractor(s) of any of the terms or conditions and failure to perform said Bid. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.
4. We, the _____ (indicate the name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the aforesaid period of _____ days _____ and it shall continue to be so enforceable till all the dues of the CSPTCL under or by virtue of the said Bid have been fully paid and its claims satisfied or discharged or till **E.D. / C. E. (P&P)**, CSPTCL certifies that the terms and conditions of the said Bid have been fully and properly carried out by the said Contractor(s) and accordingly discharge this guarantee. Unless a demand or claim under this discharges from all liability under this guarantee thereafter.

5. We, the _____ (indicate the name of the bank) further agree with the CSPTCL that CSPTCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bid or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time only of the powers exercisable by CSPTCL against the said Contractor(s) and to forebear or enforce any of the terms and conditions relating to the said Bid and we shall not be relieved from our liability by reason of any such variation, postponement or extension being granted to the said Contractor or for any forbearance, act or omission on the part of CSPTCL or any indulgence by CSPTCL to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.
6. The beneficiary of this Bank Guarantee shall be Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of erstwhile CSEB Raipur). The proceeds / encashment of this Bank Guarantee would go in the name of Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor company of erstwhile CSEB Raipur).
7. It is agreed to by the Bank with the CSPTCL that if for any reason a dispute arises concerning the Bank Liability to pay the requisite amount to the CSPTCL under the terms of this guarantee, the competent court at Raipur alone shall have the jurisdiction to determine the said dispute and that this shall be without prejudice to the liability of the Bank under the terms of this guarantee being unequivocal and unconditional. The beneficiary of this Bank Guarantee shall be Chhattisgarh State Power Transmission Company Limited, Raipur (A Successor Company of erstwhile CSEB Raipur).
8. We, the _____ (indicate the name of the bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of CSPTCL in writing.

Dated, the ____ days of _____.

WITNESS (SIGNATURE WITH NAME & ADDRESS)

1.

2.

For _____

(Indicate name of Bank)

ANNEXURE –36**PROFORMA FOR UNDERTAKING BY THE JOINT VENTURE PARTNERS**

(To be executed on Non-Judicial Stamp Paper worth Rs. 100.00 &Rs. 1.00 revenue stamps)

THIS JOINT DEED OF UNDERTAKING executed on this..... day of..... Two Thousand and..... by a company incorporated under the laws of and having its Registered Office at(hereinafter called the “Lead Partner” which expression shall include its successors, executors and permitted assigns) and M/s..... a company incorporated under the laws ofand having its Registered Office at (hereinafter called the “Other partner” which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the “Contract”{in case of award}] against the Specification No **TR-__** for *(insert name of the project)* of C.S. Power Transmission Co. Ltd, a Company incorporated under the Companies Act of 1956 having its registered office at Dangania, Raipur (hereinafter called the “CSPTCL”).

AND WHEREAS CSPTCL invited bids as per the above mentioned Specification for construction ofstipulated in the bidding documents under Specification No **TR- -__***(insert name of the project)*

AND WHEREAS Qualification Criteria of the specification stipulates that an Undertaking of not more than two firms as partners, meeting the requirements of Qualification Criteria, as applicable may bid, provided, the Joint Venture fulfills all other requirements of Qualification Criteria and in such a case, the Bid Forms shall be signed by both the partners so as to legally bind the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract and all obligations hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to CSPTCL vide proposal No.....dated by the “Lead Partner” based on this Undertaking between both parties; under these presents and the bid in accordance with the requirements of Tender specification & Qualification Criteria has been signed by both the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:-

In consideration of the above premises and agreements the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the CSPTCL to the Joint Venture Partners, we, the Parties do hereby undertake that M/s..... shall act as “Lead Partner” and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the CSPTCL for the successful performance of the Contract and shall be fully responsible for the design, supply, erection, testing, commissioning and successful performance of the project in accordance with the Contract.

2. In case of any breach or default of the said Contract by the Lead Partner of the Joint Venture, the other partner do hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the CSPTCL suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment/ material in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of these presents undertake to promptly make good such loss or damages caused to the CSPTCL, on its demand without any demur. It shall not be necessary or obligatory for the CSPTCL to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(s), CSPTCL can proceed against other partner who shall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the CSPTCL.
4. The financial liability of the Parties of this Deed of Undertaking to the CSPTCL, with respect to any of the claims arising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Partners of this Deed of Undertaking.
5. It is expressly understood and agreed between the parties to this under taking that the responsibilities and obligations of each of the parties shall be as delineated in the tender to this Deed of Undertaking. It is further undertaken by the parties that the above sharing of responsibilities & obligations shall not in any way be a limitation of joint and several responsibilities of the parties under the contract.
6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Joint Venture, other than the express provisions of the Contract.
7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.
8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favour of the CSPTCL in the currency/currencies of the Contract.
9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the CSPTCL discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Deed of Undertaking have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Seal of
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated
Name
Designation
Signature

For "Lead Partner"
For and on behalf of M/s
.....
(Signature of the authorized
Representative)

WITNESS :

I.....

II.

Seal of
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated
Name
Designation
Signature

For "other Partner"
For and on behalf of
M/s.....
(Signature of the authorized
representative)

WITNESS :

I.....

II.

Note :

1. The non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture and the date of purchase should not be later than six months of date of execution of the Undertaking.
2. The Undertaking shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

ANNEXURE –37**PROFORMA FOR POWER OF ATTORNEY FOR JOINT VENTURE**

(To be executed on Non-Judicial Stamp Paper worth Rs. 100.00 & Rs.1.00 revenue stamps)

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder have formed a Joint Venture under the laws of and having our Registered Office(s)/Head Office(s) at (hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s being the "Lead Partner" do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of and having its Registered/Head Office at as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorized Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to Specification No **TR-.....** the bids for which have been invited by Executive Director (Procurement & Projects), Dangania, Raipur of C.S. Power Transmission Co. Ltd. (CSPTCL) to undertake the following acts :

- i) To submit proposal and participate in the aforesaid Bid Specification of the CSPTCL on behalf of the "Joint Venture".
- ii) To negotiate with the CSPTCL the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the CSPTCL for and on behalf of the "Joint Venture".
- iii) To do any other act or submit any document related to the above.
- iv) To receive, accept and execute the Contract for and on behalf of the "Joint Venture".

It is clearly understood that the Lead Partner shall ensure timely execution of the Contract. In case of any breach of contract by any of the joint venture/consortium partners during execution of the contract, it will be the sole discretion of CSPTCL to allow the other partner to complete the work or to terminate the total contract.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Maintenance Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/Authorized Representatives/Partner in-charge/Lead Partner quotes in the bid, negotiates and signs the Contract with the CSPTCL and/or proposes to act on behalf of the Joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

IN WITNESS THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this day of under the Common Seal(s) of their Companies.

For and on behalf of the
Partners of Joint Venture

.....
.....
.....

The Common Seal of the above Partners of the Joint Venture:

The Common Seal has been affixed there unto in the presence of:

WITNESS

1. Signature.....

2.

Signature.....

Name

Name

Designation

Designation

Occupation

Occupation

Note:

1. The non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture and the date of purchase should not be later than six months of date of execution of the Agreement.
2. The Agreement shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

ANNEXURE –38

DECLARATION BY THE BIDDER

(To be furnished the Sole bidder/ Lead partner as well as other partner of the JV Separately)

(Please ensure the language of the format is maintained to avoid bid rejection)

Name of the bidder (Sole bidder / JV partners) :

- 1) (Name of the bidder) M/s..... is not debarred/ Blacklisted by Bank / State Govt./ Central Govt. /State PSU/CPSU/SEB/ Public utility as on date of issue of NIT.
- 2) All the document/ statements/ attachments/ information submitted by (Name of the bidder) M/sin proof of qualifying requirements are authentic/ genuine/ correct and in case, any of the said documents/ statements/ attachments/ information is found to be false / fake/ misleading, the bid will be disqualified and action will be taken as per relevant provisions of the tender.

Date

SIGNATURE OF BIDDER

placeName

Designation.....

(Seal of Company)

ANNEXURE –39

CERTIFICATE ISSUED BY CHARTERED ACCOUNTANT *(To be furnished for Sole bidder/Lead Partner as well as other Partner of JV in original) (Please ensure the language of the format is maintained to avoid bid rejection)*

Name of the bidder (Sole bidder/JV partners) :

- a) All payment obligations (principal / Interest) on outstanding debentures (i.e. debentures which have not yet been redeemed) have been discharged and no such payment as on **31.12.2020** is outstanding / overdue.
- b) The bidding company is presently not in default in payment of any bank loan or interest thereon for more than three months or any loan account of the bidder has not been classified as NPA (Non performing assets) by the creditor/ lending bank as on date of issue of NIT.
- c) The bidding company is not going through the process of insolvency or liquidation as on the date of issue of NIT. Even, if at a later date up to placement of order against the instant tender, it comes to the notice of CSPTCL that the sole bidder/ any partner of JV has been going through the process of insolvency or liquidation, their bid will be rejected.

Date

SIGNATURE OF CHARTERED
ACCOUNTANT

Place

NAME
(SEAL)

ANNEXURE – 40
UNDERTAKING FOR PERSONNEL CAPABILITIES

(To be furnished for Sole bidder/Lead Partner as well as other Partner of JV)

I/WE (Designation) of (Name of bidder) hereby undertake that we have adequate experienced personnel with necessary license/workman permit issued by the Electrical Licensing to execute the project and the details are hereunder:-

1) PERSONNEL IN MANAGERIAL POSITION

Sl. No.	Name of person with designation	Educational/Tech. Qualifications	Year of experience	Details of License

2) PERSONNEL IN SUPERVISORY POSITION

Sl. No.	Name of person with designation	Educational/Tech. Qualifications	Year of experience	Details of Licence

3) PERSONNEL IN WORKMEN CATEGORY

SL. No.	Name of person with designation	Educational/Tech. Qualifications	Year of experience	Details of Licence

Date

SIGNATURE OF BIDDER

Place

NAME

DESIGNATION

(SEAL)

ANNEXURE – 41

UNDERTAKING FOR EQUIPMENT CAPABILITIES

(To be furnished for Sole bidder/Lead Partner as well as other Partner of JV)

I/WE (Designation) of (Name of bidder) hereby undertake that we have adequate tools & plants required for execution of various activities involved in construction of EHV transmission line :-

Date

SIGNATURE OF BIDDER

Place

NAME

DESIGNATION

(SEAL)

ANNEXURE –42(a)

F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block,
New Delhi
23rd July, 2020

Office Memorandum

Subject: Insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017

Rule 144 of the General Financial Rules 2017 entitled 'Fundamental principles of public buying', has been amended by inserting sub-rule (xi) as under:

Notwithstanding anything contained in these Rules, Department of Expenditure may, by order in writing, impose restrictions, including prior registration and/or screening, on procurement from bidders from a country or countries, or a class of countries, on grounds of defence of India, or matters directly or indirectly related thereto including national security; no procurement shall be made in violation of such restrictions.



(Sanjay Prasad)
Joint Secretary (PPD)
Email ID: js_pfc2.doe@gov.in
Telephone: 011-23093882

To,
(1) Secretaries of All Ministries/ Departments of Government of India
(2) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

F.No.6/18/2019-PPD
Ministry of Finance
Department of Expenditure
Public Procurement Division

161, North Block,
New Delhi
23rd July, 2020

Order (Public Procurement No. 1)

Subject: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017

Attention is invited to this office OM no. 6/18/2019-PPD dated 23rd July 2020 inserting Rule 144 (xi) in GFRs 2017. In this regard, the following is hereby ordered under Rule 144 (xi) on the grounds stated therein:

Requirement of registration

1. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority, specified in **Annex I**.
2. This Order shall not apply to (i) cases where orders have been placed or contract has been concluded or letter/notice of award/ acceptance (LoA) has been issued on or before the date of this order; and (ii) cases falling under **Annex II**.

Transitional cases

3. Tenders where no contract has been concluded or no LoA has been issued so far shall be handled in the following manner: -
 - a) *In tenders which are yet to be opened, or where evaluation of technical bid or the first exclusionary qualifying stage (i.e. the first stage at which the qualifications of tenderers are evaluated and unqualified bidders are excluded) has not been completed. No contracts shall be placed on bidders from such countries. Tenders received from bidders from such countries shall be dealt with as if they are non-compliant with the tender conditions and the tender shall be processed accordingly.*
 - b) *If the tendering process has crossed the first exclusionary qualifying stage: If the qualified bidders include bidders from such countries, the*

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entire process shall be scrapped and initiated *de novo*. The *de novo* process shall adhere to the conditions prescribed in this Order.

- c) As far as practicable, and in cases of doubt about whether a bidder falls under paragraph 1, a certificate shall be obtained from the bidder whose bid is proposed to be considered or accepted, in terms of paras 8, 9 and 10 read with para 1 of this Order.

Incorporation in tender conditions

4. In tenders to be issued after the date of this order, the provisions of paragraph 1 and of other relevant provisions of this Order shall be incorporated in the tender conditions.

Applicability

5. Apart from Ministries / Departments, attached and subordinate bodies, notwithstanding anything contained in Rule 1 of the GFRs 2017, this Order shall also be applicable
- a. to all Autonomous Bodies;
 - b. to public sector banks and public sector financial institutions; and
 - c. subject to any orders of the Department of Public Enterprises, to all Central Public Sector Enterprises; and
 - d. to procurement in Public Private Partnership projects receiving financial support from the Government or public sector enterprises/ undertakings.
 - e. Union Territories, National Capital Territory of Delhi and all agencies/ undertakings thereof

Definitions

6. "Bidder" for the purpose of this Order (including the term 'tenderer', 'consultant' 'vendor' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency, branch or office controlled by such person, participating in a procurement process.
7. "Tender" for the purpose of this Order will include other forms of procurement, except where the context requires otherwise.
8. "Bidder from a country which shares a land border with India" for the purpose of this Order means

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- a) An entity incorporated, established or registered in such a country; or
- b) A subsidiary of an entity incorporated, established or registered in such a country; or
- c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
- d) An entity whose *beneficial owner* is situated in such a country; or
- e) An Indian (or other) agent of such an entity; or
- f) A natural person who is a citizen of such a country; or
- g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

9. "Beneficial owner" for the purpose of paragraph 8 above will be as under:

- (i) In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person(s), has a controlling ownership interest or who exercises control through other means.
Explanation—
 - a. "Controlling ownership interest" means ownership of, or entitlement to, more than twenty-five per cent of shares or capital or profits of the company;
 - b. "Control" shall include the right to appoint the majority of the directors or to control the management or policy decisions, including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
- (ii) In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership or entitlement to more than fifteen percent of capital or profits of the partnership;
- (iii) In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
- (iv) Where no natural person is identified under (i) or (ii) or (iii) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

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(v) In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

10. "Agent" for the purpose of this Order is a person employed to do any act for another, or to represent another in dealings with third persons.

Sub-contracting in works contracts

11. In works contracts, including turnkey contracts, contractors shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. The definition of "contractor from a country which shares a land border with India" shall be as in paragraph 8 above. This shall not apply to sub-contracts already awarded on or before the date of this Order.

Certificate regarding compliance

12. A certificate shall be taken from bidders in the tender documents regarding their compliance with this Order. If such certificate given by a bidder whose bid is accepted is found to be false, this would be a ground for immediate termination and further legal action in accordance with law.

Validity of registration

13. In respect of tenders, registration should be valid at the time of submission of bids and at the time of acceptance of bids. In respect of supply otherwise than by tender, registration should be valid at the time of placement of order. If the bidder was validly registered at the time of acceptance / placement of order, registration shall not be a relevant consideration during contract execution.

Government E-Marketplace

14. The Government E-Marketplace shall, as soon as possible, require all vendors/ bidders registered with GeM to give a certificate regarding compliance with this Order, and after the date fixed by it, shall remove non-compliant entities from GeM unless/ until they are registered in accordance with this Order.

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Model Clauses/ Certificates

15. Model Clauses and Model Certificates which may be inserted in tenders / obtained from Bidders are enclosed as **Annex III**. While adhering to the substance of the Order, procuring entities are free to appropriately modify the wording of these clauses based on their past experience, local needs etc. without making any reference to this Department.


(Sanjay Prasad)

Joint Secretary (PPD)

Email ID: js.pfc2.doe@gov.in

Telephone: 011-23093882

To

- (1) Secretaries of All Ministries/ Departments of Government of India for information and necessary action. They are also requested to inform these provisions to all procuring entities.
- (2) Secretary, Department of Public Enterprises with a request to immediately reiterate these orders in respect of Public Enterprises.
- (3) Secretary DPIIT with a request to initiate action as provided under Annex I
- (4) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

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Annex I: Competent Authority and Procedure for Registration

- A. The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)*.
- B. The Registration Committee shall have the following members*:
- i. An officer, not below the rank of Joint Secretary, designated for this purpose by DPIIT, who shall be the Chairman;
 - ii. Officers (ordinarily not below the rank of Joint Secretary) representing the Ministry of Home Affairs, Ministry of External Affairs, and of those Departments whose sectors are covered by applications under consideration;
 - iii. Any other officer whose presence is deemed necessary by the Chairman of the Committee.
- C. DPIIT shall lay down the method of application, format etc. for such bidders as stated in para 1 of this Order.
- D. On receipt of an application seeking registration from a bidder from a country covered by para 1 of this Order, the Competent Authority shall first seek political and security clearances from the Ministry of External Affairs and Ministry of Home Affairs, as per guidelines issued from time to time. Registration shall not be given unless political and security clearance have both been received.
- E. The Ministry of External Affairs and Ministry of Home Affairs may issue guidelines for internal use regarding the procedure for scrutiny of such applications by them.
- F. The decision of the Competent Authority, to register such bidder may be for all kinds of tenders or for a specified type(s) of goods or services, and may be for a specified or unspecified duration of time, as deemed fit. The decision of the Competent Authority shall be final.
- G. Registration shall not be granted unless the representatives of the Ministries of Home Affairs and External Affairs on the Committee concur*.
- H. Registration granted by the Competent Authority of the Government of India shall be valid not only for procurement by Central Government and its agencies/ public enterprises etc. but also for procurement by State Governments and their agencies/ public enterprises etc. No fresh registration at the State level shall be required.

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- I. The Competent Authority is empowered to cancel the registration already granted if it determines that there is sufficient cause. Such cancellation by itself, however, will not affect the execution of contracts already awarded. Pending cancellation, it may also suspend the registration of a bidder, and the bidder shall not be eligible to bid in any further tenders during the period of suspension.
- J. For national security reasons, the Competent Authority shall not be required to give reasons for rejection / cancellation of registration of a bidder.
- K. In transitional cases falling under para 3 of this Order, where it is felt that it will not be practicable to exclude bidders from a country which shares a land border with India, a reference seeking permission to consider such bidders shall be made by the procuring entity to the Competent Authority, giving full information and detailed reasons. The Competent Authority shall decide whether such bidders may be considered, and if so shall follow the procedure laid down in the above paras.
- L. Periodic reports on the acceptance/ refusal of registration during the preceding period may be required to be sent to the Cabinet Secretariat. Details will be issued separately in due course by DPIIT.

***Note:**

- i. In respect of application of this Order to procurement by/ under State Governments, all functions assigned to DPIIT shall be carried out by the State Government concerned through a specific department or authority designated by it. The composition of the Registration Committee shall be as decided by the State Government and paragraph G above shall not apply. However, the requirement of **political and security clearance as per para D shall remain and no registration shall be granted without such clearance.**
- ii. Registration granted by State Governments shall be valid only for procurement by the State Government and its agencies/ public enterprises etc. and shall not be valid for procurement in other states or by the Government of India and their agencies/ public enterprises etc.]

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Annex II: Special Cases

- A. Till 31st December 2020, procurement of medical supplies directly related to containment of the Covid-19 pandemic shall be exempt from the provisions of this Order.
- B. *Bona fide* procurements made through GeM without knowing the country of the bidder till the date fixed by GeM for this purpose, shall not be invalidated by this Order.
- C. *Bona fide* small procurements, made without knowing the country of the bidder, shall not be invalidated by this Order.
- D. In projects which receive international funding with the approval of the Department of Economic Affairs (DEA), Ministry of Finance, the procurement guidelines applicable to the project shall normally be followed, notwithstanding anything contained in this Order and without reference to the Competent Authority. Exceptions to this shall be decided in consultation with DEA.
- E. This Order shall not apply to procurement by Indian missions and by offices of government agencies/ undertakings located outside India.

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Annex III

Model Clause /Certificate to be inserted in tenders etc.

(While adhering to the substance of the Order, procuring entities and GeM are free to appropriately modify the wording of the clause/ certificate based on their past experience, local needs etc.)

Model Clauses for Tenders

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
- II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -
 - a. An entity incorporated, established or registered in such a country; or
 - b. A subsidiary of an entity incorporated, established or registered in such a country; or
 - c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
 - d. An entity whose *beneficial owner* is situated in such a country; or
 - e. An Indian (or other) agent of such an entity; or
 - f. A natural person who is a citizen of such a country; or
 - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- IV. The *beneficial owner* for the purpose of (iii) above will be as under:
 1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation—

 - a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

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- b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership or entitlement to more than fifteen percent of capital or profits of the partnership;
 3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
 4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
 5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.
- V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.
- VI. *[To be inserted in tenders for Works contracts, including Turnkey contracts]* The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Model Certificate for Tenders (for transitional cases as stated in para 3 of this Order)

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I hereby certify that this bidder is not from such a country and is eligible to be considered."

Model Certificate for Tenders

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the

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Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Model Certificate for Tenders for Works involving possibility of sub-contracting

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

Model Certificate for GeM:

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this vendor/ bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this vendor/ bidder fulfills all requirements in this regard and is eligible to be considered for procurement on GeM. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

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Annexure- 42(b)

No. F.18/37/2020-PPD
Government of India
Ministry of Finance
Department of Expenditure
Procurement Policy Division

512, Lok Nayak Bhawan,
New Delhi. Dated the 8th February 2021

OFFICE MEMORANDUM

Subject: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017.


Attention is invited to this Department's Order (Public Procurement No.1) issued vide OM F.No.6/18/2019-PPD dated 23.07.2020. As per para 11 of the Order, in case of Works contracts, including turnkey contracts, contractors shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. However, no such restriction is stipulated in the Order regarding other procurements i.e. procurement of Goods, Services, etc.

2. This office is in receipt of representations seeking clarification whether it is permitted for the bidders to procure raw material or components/ sub-assemblies or the finished goods etc. from the vendors from the countries sharing land borders with India.

3. In this context following is hereby clarified:

- i A bidder is permitted to procure raw material, components, sub-assemblies etc. from the vendors from countries which shares a land border with India. Such vendors will not be required to be registered with the Competent Authority, as it is not regarded as "sub-contracting".
- ii However, in case a bidder has proposed to supply finished goods procured directly/ indirectly from the vendors from the countries sharing land border with India, such vendor will be required to be registered with the Competent Authority.

4. This is issued with the approval of Secretary (Expenditure).


Kotluru Narayana Reddy
Deputy Secretary to the Govt. of India
Tel.: 24621305
Email: kn.reddy@gov.in

To

- (1) Secretaries of All Ministries/ Departments of Government of India,
- (2) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi.

ANNEXURE-43

Certification by the Bidder as per order no. F.No.6/18/2019-PPD dated 23/07/2020 read with amended order No.F.No.18/37/2020-PPD Dtd.08.02.2021 and any subsequent amendments issued upto date of issue of N.I.T. issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India (DoE Order)

(In case of a Joint Venture bid, the declaration/ certification shall be given by all partners of the Joint Venture)

Bidder's Name and Address: To:
 Name:..... Chief Engineer (Planning & Projects),
 Address:..... Chhattisgarh State Power Transmission Co. Ltd.
 Third Floor, SLDC Building, CSEB Campus
 Dangania, Raipur (C.G.)-492013

Dear Sir,

We have read and understood the provisions of Order no. F.No.6/18/2019-PPD (Order Public Procurement no.1) dated 23/07/2020 & No.18/37/2020-PPD Dtd.08.02.2021 regarding "Restriction under Rule 144(xi) of General Financial Rules" and F.No.6/18/2019-PPD (Order Public Procurement no.2) dated 23/07/2020 and No.18/37/2020-PPD Dtd.08.02.2021 regarding "Exclusion from Restrictions under Rule 144(xi) of the General Financial Rules" issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India [hereinafter collectively referred as "DoE Order"] and any subsequent modifications/Amendments, if any.

Particularly, we, the Bidder, have read the clause regarding restrictions on procurement from a 'Bidder of a country which shares a land border with India' and on sub-contracting to contractors from such countries.

We certify that we, the bidder is/are not from such a country and will not subcontract any work to a subcontractor/sub vendor from such countries and is eligible to be considered.

Or

We certify that we, the bidder and/or our subcontractor/sub vendor is/are from such a country which shares a land border with India, as brought out in the aforementioned orders. We are registered with the competent authority as defined in the Ministry of Finance, Govt. of India vide order mentioned above & a self-attested copy of registration certificate issued by the competent authority is enclosed along with the bid.

Tick (✓) in the box () as applicable

We further declare that any misrepresentation or submission of false/forged document/information in this regard shall be dealt with as per the provisions of Integrity Pact and/or Bidding Documents and/or CSPTCL's policy and procedures.

Date:

Name:

Place:

Designation

Price Schedule A-1

SUPPLY OF MATERIALS

(SCANNED COPY DULY SIGNED BY BIDDERS TO BE UPLOADED)

**Price Bid schedule for Supply of Materials for construction of 220 KV DCDS line
from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan, Distt. - Durg
(Approx. 24 Km.)
(Amount in Rupees)**

S. NO.	PARTICULARS	Unit	Qty.	Unit rate (Ex-works price)	GST @ 18% on Sl. No.5	Freight	GST @ 18% on Sl. No.7	Total Unit Rate (FORD) = 5+6+7+8	Total Amount = Sl. No.4 x Sl.No.9
1	2	3	4	5	6	7	8	9	10
1	Supply of Towers: Supply of G.I. Towers and their extensions including Stub, super structure, Gantry structure, Hangers, U-Bolts, D-shackle & packing washer as per requirement (All G.I. Steel Structures)	MT	600						
2	G.I. nuts & Bolts	M.T.	19						
3	G.I. Spring Washers	M.T.	03						
4	ACSR Panther Conductor	K.M.	146						
5	OPGW Fibre optic cable(OPGW,24F Fibre DWSM)	K.M.	27						
6	Single Suspension H/W with AGS Assembly for ACSR Zebra conductor	Nos.	192						
7	Double Suspension H/W with AGS Assembly for ACSR Zebra conductor	Nos.	48						
8	Single Tension H/W Assembly for ACSR Zebra conductor	Nos.	420						
9	Double Tension H/W for ACSR Zebra conductor	Nos.	60						
10	Pilot String hardware for ACSR Zebra conductor	Nos.	00						
11	Vibration Dampers for ACSR Zebra conductor	Nos.	960						

S. NO.	PARTICULARS	Unit	Qty.	Unit rate (Ex-works price)	GST @ 18% on Sl. No.5	Freight	GST @ 18% on Sl. No.7	Total Unit Rate (FORD) = 5+6+7+8	Total Amount = Sl. No.4 x Sl.No.9
1	2	3	4	5	6	7	8	9	10
12	Mid-Span Joints for ACSR Zebra conductor	Nos.	100						
13	Repair Sleeve for ACSR Zebra conductor	Nos.	15						
14	Suspension Assembly for OPGW	Nos.	40						
15	Tension Assembly for OPGW	Nos.	80						
16	Inline Splice enclosure for OPGW fittings	No.	09						
17	Vibration Dampers for OPGW	Nos.	160						
18	Terminal equipments for OPGW fitting as S/s. end including installation	Nos.	02						
19	70 KN Disc Insulator	Nos.	3800						
20	160 KN Disc Insulator	Nos.	7650						
21	220 KV Solid core / Polycone insulator with clamps	Nos.	06						
22	Enamelled Danger Board	Nos.	80						
23	Enamelled Number Plate	Nos.	80						
24	Phase Plate ('R', 'Y' & 'B') Per loc	Per Loc.	160						
25	Anti-Climbing Device complete set including barbed wire on towers Per loc	Per Loc.	80						
26	Earthing Set (Earthing Rod with clamps and G.I. Wire – (2 Nos. in each tower)	Per Loc.	160						
27	Counterpoise earthing Per loc	Per Loc.	10						
28	Copper Earth Bond	Per Loc.	100						
Total (Rs.)									

NOTE:-

- Please be noted, it is obligatory to quote rates in above prescribed format. In case break-up of ex-works & taxes (GST) etc. are not given, the tender bid may be rejected.

2. The above quantities are provisional & estimated for comparison of bid. The quantities may vary during actual execution of the work as per profile approved.
3. The rate will be FIRM except galvanised Tower Parts and ACSR Panther Conductor during entire contractual period and no any other charges/duties other than mentioned above will be payable by CSPTCL. The rates of galvanized tower parts & ACSR panther Conductor should be quoted on variable price basis as per Annexure-27 & 28. Please indicate basic unit rate/GST/Freight charges in respect of supply of galvanised tower parts & ACSR Conductor so as to enable payment of PV on Ex-work rates.
4. The rate should be quoted considering the taxes and duties as per tender clause 3.17.
For tower parts & ACSR Conductor may be bought out or self manufactured items:-Bidders are requested to furnish break-up of prices of tower parts & ACSR Conductor GST and other levies, if any, separately wherever applicable in respective column.
5. Payment of other taxes/duties/levies/charges which are not described above. The bidder should be aware of the various taxes, duties, levies imposed by the Central Government, State Government / local bodies applicable in the present contract as on the date of TC bid opening. Further, in the price bid, it should be specifically stated regarding each tax / duty whether it is inclusive or exclusive. However, if there is no specific mention of any duties/levies as exclusive in the price bid, it will be presumed to be inclusive if it is applicable as on the date of TC bid opening and will not be paid extra.
6. The cess under “Building and other Construction Workers Act, 1996 @ 1% of the cost of supply of materials shall be borne by the contractor which shall be deducted from each bill. **Any variation in this respect within scheduled completion period shall be to the account of CSPTCL.**
7. **Any other new tax: - If any new tax/ duty/ levy is imposed either by central Government or by Stat Govt. / local authorities after the date of opening of T.C. Bid, the same shall be payable by CSPTCL extra within stipulated completion period on production of documentary evidence. However, tax due to increase of Turnover or withdrawal of tax exemption earlier available to the vendor etc. will not be reimbursed.**

Signature :

Name :

Date

Designation :

PRICE BID SCHEDULE – A-2**CONSTRUCTION CHARGES****(SCANNED COPY DULY SIGNED BY BIDDERS TO BE UPLOADED)**

PRICE BID SCHEDULE of construction Charges for construction of 220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan, Distt. - Durg (Approx. 24 Km.) (Amount in Rupees)

S.N.	PARTICULARS	Unit	Quantity	Unit rate	GST @ 18% on unit rate	Total Unit Rate = 5+6	Total Amount = Sl. No.4 x Sl.No.7
1	2	3	4	5	6	7	8
1(a)	Survey including Reconnaissance survey, Preliminary Survey, Measurement of SR, Detailed Survey including profiling, site clearance and tower spotting of the line etc.	K.M.	24				
1(b)	Check Survey including site clearance etc.	K.M.	24				
2	Soil investigation	Loc.	10				
3	Excavation in :-						
A	Dry Soil (Normal +BC+ Sandy)	Cu.M.	6000				
B	Wet Soil (Wet+PS+FS)	Cu.M.	2500				
C	Soft Rock (DFR+SFR)	Cu.M.	4000				
D	Hard Rock	Cu.M.	10				
4	Setting of Template :- Both for Normal & Extension towers						
A	BN-2 (0-2° tower)	Nos	40				
B	BN-30 (30° tower)	Nos	25				
C	BN-60 (60° tower)	Nos	15				
D	Gantry (3 columns + 2 beams)	Sets /Nos.	02				
H	SPECIAL TOWER in DN Series	Nos.	0				

S.N.	PARTICULARS	Unit	Quantity	Unit rate	GST @ 18% on unit rate	Total Unit Rate = 5+6	Total Amount = Sl. No.4 x Sl.No.7
5	Stub Setting						
(A)	Lean concrete 1:3:6 ratio Mix M-10 Including cost of Cement, Metal & Sand, Back Filling, Muffing, Coping & Curing etc.	Cu.M.	220				
(B)	Concreting 1:1.5:3 ratio Mix M-20 Including Cost of Cement, Metal & Sand, Back Filling, Muffing, Coping & Curing etc.	Cu.M.	1603				
(C)	Concreting 1:2:4 ratio Mix M-15 Including Cost of Cement, Metal & Sand, Back Filling, Muffing, Coping & Curing etc.	Cu.M.	10				
6	Reinforcement including cost of material	M.T.	118				
7	Protection of tower footings						
(i)	Benching	Cu.M	300				
(ii)	Revetment work						
a	Cost of building revetment with stones with 1:5 cement mortar per Cum of stone masonry including all material including cement.	Cum.	100				
b	Cost of top seal cover of revetment wall with 1:2:4 mix concrete including all material including cement.	Cum.	20				
c	Back filling and leveling of the volume enclosed by revetment walls in Cum.	Cum.	100				
d	Cost of concrete 1:3:6 mix required for base padding including all material including cement.	Cum.	10				
8	Erection of Tower / Gantry structure (Excluding the weight of Nut, bolts, stub & Template etc.)	M.T.	596				
9	Installation and Stringing of (D.C.D.S.) ACSR Zebra conductor including insulator string hoisting complete & necessary hardware clipping and fixing of conductor accessories etc. including	K.M.	24				

S.N.	PARTICULARS	Unit	Quantity	Unit rate	GST @ 18% on unit rate	Total Unit Rate = 5+6	Total Amount = Sl. No.4 x Sl.No.7
	installation & stringing of 01 No. OPGW including insulator hoisting & clipping etc. complete in all respect.						
10	Cost of peripheral welding of G.I. nuts & bolts above Ground Level per tower as per clause 4.45 (Including Gantry in set)	Per tower	80				
11	Fixing of ACD, DB, Number Plates & Phase Plate etc. per tower	Per tower	80				

(Rupees _____ only.

NOTE:-

i)Please be noted, it is obligatory to quote rates in above prescribed format. In case break-up of ex-works & taxes (GST) etc. are not given, the tender bid may be rejected .

ii)The cess under “Building and other Construction Workers Act, 1996@ 1% of the cost of construction work shall be borne by the contractor which shall be deducted from each bill. **Any variation in this respect within contractual completion period shall be to the account of CSPTCL.**

iii)The above quantities are provisional & estimated for comparison of bid. The quantities may vary during actual execution of the work as per approved profile.

iv)The rate will be FIRM during entire contractual period and no any other charges/duties other than mentioned above will be payable by CSPTCL.

v)Payment of other taxes/duties/levies/charges which are not described above. The bidder should be aware of the various taxes, duties, levies imposed by the Central Government, State Government / local bodies applicable in the present contract as on the date of TC bid opening. If there is no specific mention of any duties/levies as exclusive in the price bid, it will be presumed to be inclusive if it is applicable as on the date of TC bid opening and will not be paid extra.

vi)**Any other new tax:** - If any new tax/ duty/ levy is imposed either by central Government or by Stat Govt. / local authorities after the date of opening of T.C. Bid, the same shall be payable by CSPTCL extra within stipulated completion period on production of documentary evidence. However, tax due to increase of Turnover or withdrawal of tax exemption earlier available to the vendor etc. will not be reimbursed.

Signature :

Name :

Date

Designation :

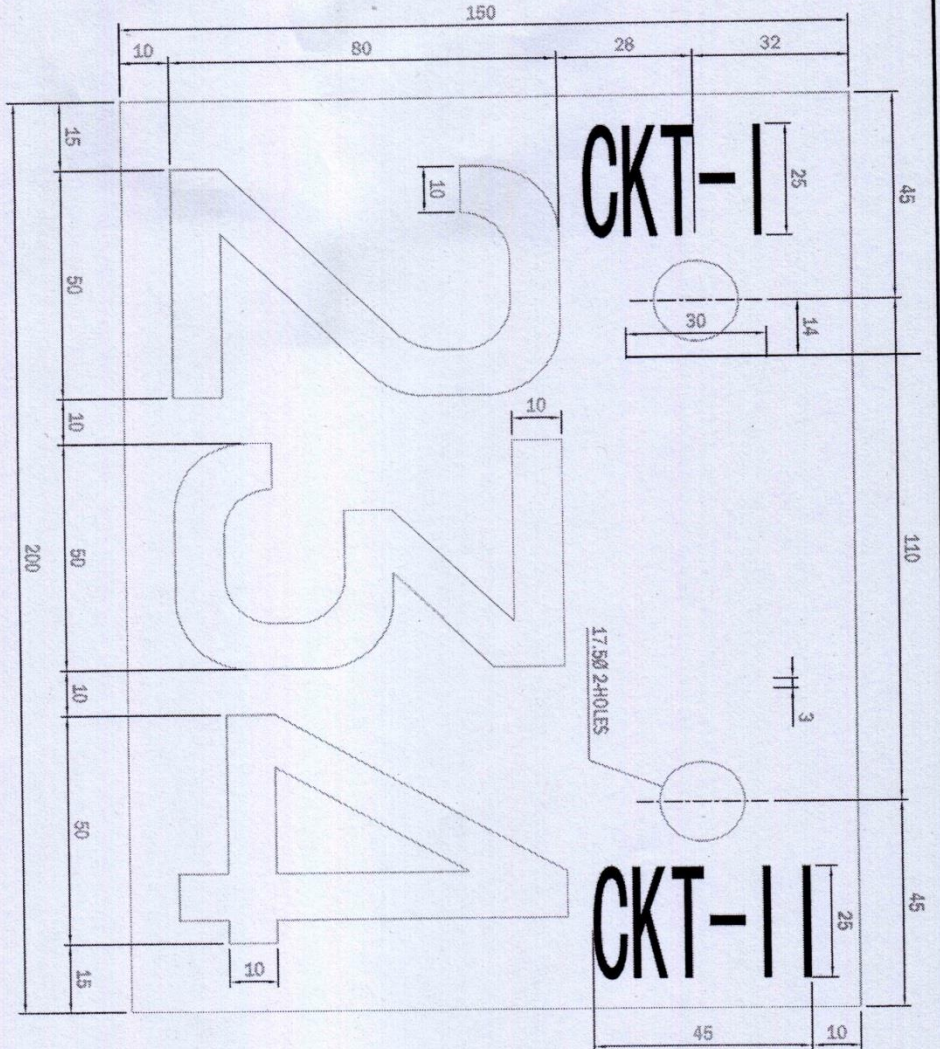
SCHEDULE – A-3**(SCANNED COPY DULY SIGNED BY BIDDERS TO BE UPLOADED)****PRICE BID SUMMARY**

Construction charges for construction Charges for construction of 220 KV DCDS line from 400/220 KV S/S Kurud to proposed 220/132 KV S/S Patan, Distt. – Durg (Approx. 24 Km.)

				Amount (Rs.)
S.No.	PARTICULARS	Amount (Rs.)	Discount, if any	Total. Amount (3-4)
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1	Cost of supply of materials (Schedule A-1)			
2	Cost of construction charges (Schedule-A-2)			
Total Amount (Sch-A-1 + Sch A-2) (Rs.) =				
Amount in words :-				

Signature :**Name :****Date :****Designation :**

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- NOTES :-
1. ALL DIMENSIONS ARE IN M.M.
 2. LETTERS SHOULD BE IN RED ENAMELED ON WHITE BACKGROUND
 3. BACK SIDE OF THE PLATE SHALL BE ENAMELED BLACK.
 4. PLATE SHALL BE 2 MM THK. MILD STEEL
 5. PLATE NUMBERING SHOULD BE IN SEQUENCE OF NUMBER OF TOWER AS PER SPKN.
 6. 2-M16 BOLTS WITH NUT AND 4-2MM THK. LEAD WASHER SHALL BE SUPPLIED WITH EACH PLATE.
 7. NAME OF THE LINE CONTAINS STARTING AND RECEIVING END.

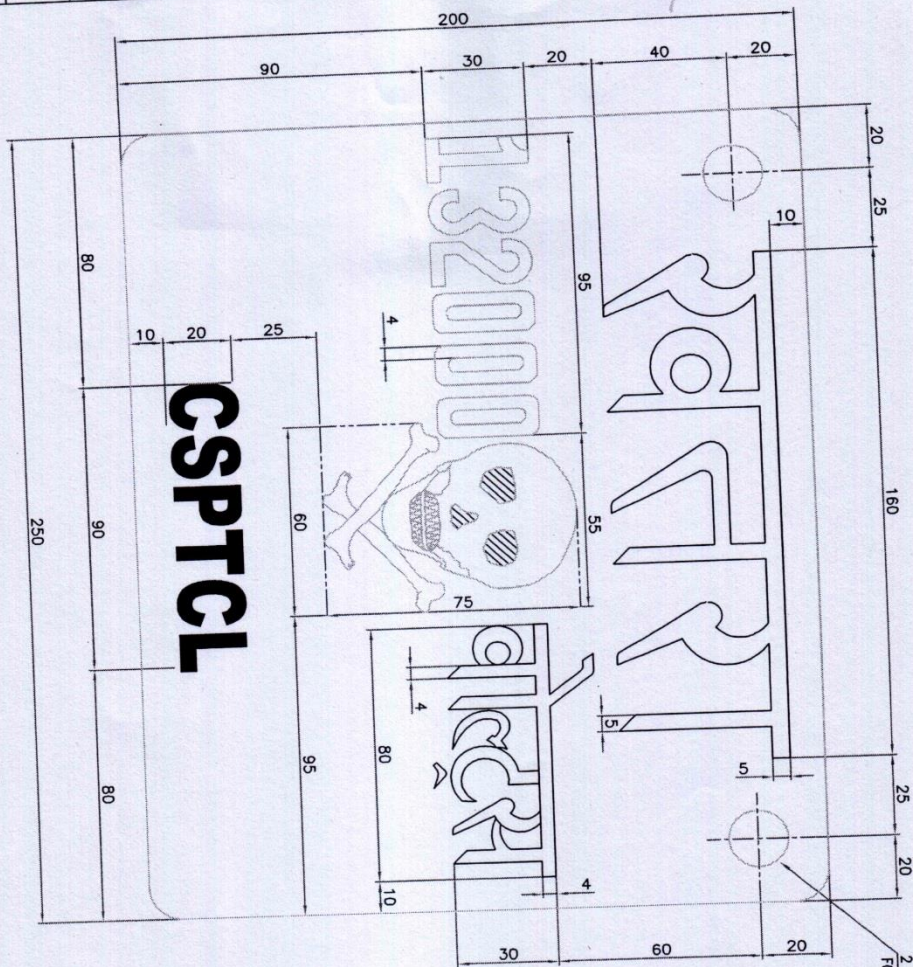
Revision	Date	Description	By	Checked By	Apprd By

132 K.V.	CSPTCL.		NUMBER / CIRCUIT PLATE	

DETAILS

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M/S JYOTI STRUCTURES LTD
MUMBAI (INDIA)



2 NOS. 17.5ø HOLES
FOR 16ø BOLTS

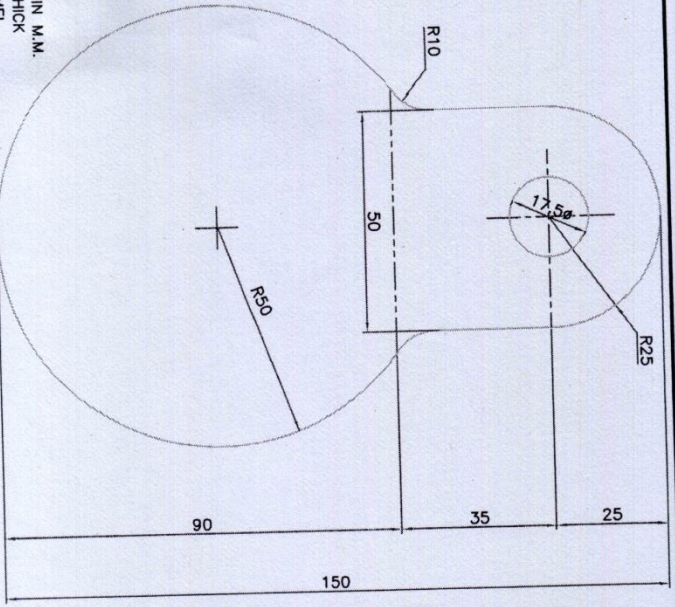
NOTES:-

1. ALL DIMENSIONS ARE IN M.M.
2. LETTERING AND FIGURE SHALL BE IN RED ENAMELLED AND BACK GROUND SHALL BE WHITE ENAMELLED
3. THE BACK SIDE OF THE PLATE SHALL BE ENAMELLED BLACK OR WHITE.
4. THE CORNERS OF THE 1.6mm THK. M.S. PLATE SHOULD BE ROUNDED OFF.
5. DESIGN OF THE DANGER PLATE IS AS PER IS:2551-1982
6. FASTENERS & WASHER
 - a) TWO 16 MM DIA HRH BOLT, 35MM LONG WITH NUT.
 - b) 4 NOS 2 MM THICK LEAD WASHERS.
7. QTY. = ONE FOR EACH TOWER

CSPTCL	DETAILS OF DANGER PLATE
DETAILS	DETAILS OF DANGER PLATE

APPROVED BY ACE (Trans.) OF CSEB VIDE LETTER
CE/Trans/TR-6/222/4634 Dated 16.03.2007.

- NOTES :-
1. ALL DIMENSIONS ARE IN M.M.
 2. M.S. PLATE 1.6mm. THICK
 3. LETTERING WHITE ENAMEL
 4. PHASE PLATES TO BE ENAMELLED RED,YELLOW & BLUE ON FRONT AND BACK.
 5. 2 Nos. 2mm. THICK LEAD WASHERS TO BE PROVIDED WITH EACH PLATE.
 6. 1 No. 16mm. X 35mm FASTENER & WASHER PER EACH PLATE
 7. PHASE PLATE AS PER IS:5613 (PART-II)



C.S.P.T.C.L.

DETAILS OF PHASE PLATE

132 KV

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