SECTION – 1.0

GENERAL TECHNICAL SPECIFICATION

TABLE OF CONTENTS

1.0.0 INTENT OF SPECIFICATION

1.1.0 This specification is intended to cover the requirements of survey works, design, engineering, manufacture, assembly, testing at manufacturer's works, proper packing for transportation, loading at shop, transportation to site, unloading, handling at site, erection, testing and commissioning of complete.

i) 400 kV Single Circuit Transmission Line between PSS-1 to CTUIL KPS-II S/s on double circuit towers with last 500 meters (approximately) on multi circuit tower(s) (four circuit towers to be shared with other developer).
ii) 400 kV Single Circuit Transmission Line between PSS-2 to CTUIL KPS-II S/s on double circuit towers with last 500 meters (approximately) on multi circuit tower(s) (four circuit towers to be shared with other developer).
iii) 400 kV Single Circuit Transmission Line between PSS-1 to PSS-2 on double circuit towers with auxiliary cross arm.
iv) One gantry tower with one girder / beam at PSS-1 for transmission line between PSS-1 to PSS-2
v) 24F and 48 F OPGW including all associated hardware, accessories & fittings as per project requirement.
vi) Fibre Optic approach cables as per project requirement
vii) Fibre Optic Joint Boxes (SS 304), Splicing of optical cables etc as per project requirement.

for efficient, safe and trouble-free operation of 2375 MW Capacity Solar-Wind-Hybrid Renewable Energy Park at Great Rann of Kutch Area, Gujarat.

1.2.0 The 2375MW GIPCL RE Hybrid Park shall evacuate the power from two (02) nos. 1200MW 400kV Pooling Substations named as PSS-1 & PSS-2 (Pooling Substaton-1 and 2).

1.3.0 This volume contains bidder's scope work & technical parameters for 400kV Double Circuit (D/C) Transmission Line from GIPCL 400kV PSS-1 & PSS-2 till around 500 meters before the CTUIL Grid Substation (GSS) at Khavda-II (KPS-II), Great Rann of Kutch, Gujarat. It also covers Double Circuit (D/C) transmission line on Multi Circuit (M/C) Transmission Tower(s) for around 500 meters from the CTUIL Khavda-II GSS end.

1.4.0 The section also covers the scope of work for One (1) nos. Gantry Tower with one beam (girder) at PSS-1 end for inter-connection between PSS-1 & 2. The connected take-off D/C Tower near PSS-1 may be considered with Auxiliary Cross-arm as an alternate to two numbers of double circuit tower. Auxiliary cross arm shall carry the following:

a) S/C Transmission line from PSS-2 on D/C Tower
b) S/C Transmission line from PSS-1 on D/C Tower
c) S/C Transmission line connectivity between PSS-1 & 2

Auxiliary cross arm, if considered by the bidder, shall be of type tested design and compliance to regulations / norms etc.

The bidder shall refer DWG NO FCE-171125-EL-SLD-2100-001 attached as a part of tender enquiry document.

1.5.0 Basic wind speed shall be as per IS 875 (Part-3) (Based on survey of India political Map printed in 2002). Bidder shall calculate the design wind pressure (Pd) as per provision of IS 875 for the project location. However, design wind pressure (Pd) to be considered for design shall not be considered less than as mentioned below:

Basic Wind Speed in m/s: 47
Design Wind Pressure, Pd (N/m^2): 1073

All structures shall be designed for wind forces

1.6.0 The transmission system shall be designed for AL-59 and ACSR conductor (whichever is stringent. Other developer lines are of ACSR Quad Moose Conductor.

1.7.0 All optical fibre cabling including fibre itself and all associated installations and hardware shall have a minimum guaranteed design life span of 25 years. Documentary evidence in support of guaranteed life span of cable & fibre shall be submitted by the Contractor during detailed engineering.

1.8.0 It is not the intent to specify completely herein all details of survey, design, engineering, assembly, commissioning, testing, transportation, packing and manufacturing etc. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation.

1.9.0 The general terms and conditions, instruction to Bidders and other attachments referred to elsewhere be hereby made part of the technical specification. Bidder's offer shall conform to all requirements stipulated in the specification.

1.10.0 Supplies and services shall be rendered in conformity with proven design principles, taking into account the current technology. The requirements of the contract must be fulfilled in its entirety. The supplies and services shall be rendered inclusive of all appliances and interconnecting arrangements with other supplies, necessary for installation of all accessories, needed for proper and reliable continuous operation and for satisfactory maintenance and repair. It is not the intent to completely specify all the details of design, construction and installation herein. Nevertheless, the equipment and installation shall confirm to a high standard of engineering, design and workmanship in all respect and shall be capable of performing continuous satisfactory operation.

1.11.0 Bidders are requested to carefully examine and understand the specifications and seek clarifications, if required, to ensure that they have understood the specifications. Such clarifications should be sought within a specific time period. Bidder's offer should not carry any parts like clarifications, interpretations and/or assumptions. However, if the bidder feels that, in his opinion, certain features brought out in his offer are superior to what has been specified, these may be highlighted separately.

1.12.0 Bidder shall provide Transmission line parameters required for first time charging and system studies.

1.13.0 Transmission system shall be designed for fault current of 63KA, 3 Sec.

2.0.0 SCOPE OF SUPPLY AND SERVICES

2.1.0 The scope of work for covers survey, design, engineering, manufacture, assembly and testing at works, packing / dispatch and transportation to site (including transit insurance), storage, erection, testing and commissioning for below:

a) 400kV Double Circuit (D/C) Transmission Line from GIPCL 400kV PSS-1 & PSS-2 till around 500 meter before the CTUIL Grid Substation (GSS) at Khavda-II (KPS-II), Great Rann of Kutch, Gujarat.

b) Double Circuit (D/C) transmission line on Multi Circuit (M/C) Transmission Tower(s) for around 500 meters from the CTU Khavda-II GSS end (KPS-II). The other D/C lines shall be used by some other developer getting connected to CTU Khavda-II GSS. The bidder / vendor needs to only provide the cross arms for the other developers, no need to provide conductor, insulator, hardware etc.

c) One (1) Gantry Tower with one beam (girder) at PSS-1 end (similar design of other gantry towers at PSS-1, design data of PSS-1 gantry tower shall be provided to successful contractor for inter-connection between PSS-1 & 2.

d) D/C take-off tower near PSS-1 shall have either two nos of double circuit tower OR tower with Auxiliary cross-arm or bidders options for carrying the following line arrangements:

i. S/C transmission line from GIPCL PSS-2
ii. S/C transmission line from GIPCL PSS-1
iii. S/C Transmission line connectivity between PSS-1 & 2 through auxiliary arm of the D/C tower. The said D/C tower with Auxiliary cross arm (if opted) shall be of type tested design.

e) Transmission line from PSS-2 up to outside of the RE Park (south side) shall be constructed within 11 meter corridor only. (Bidder shall refer attached drawing)

f) On Type-I Road (Pl refer attached drawing), for tower spotting and optimization shall be carried out so that Hume pipe crossing, Culvert are not disturbed.

g) 24F OPGW cable laying from GIPCL PSS-2 to KPS-II FODP with dropping at GIPCL PSS-1 and then routed back to transmission tower, from there it shall be directly terminated/spliced at KPS-II FODP.

h) 24F OPGW cable laying from GIPCL PSS-1 to KPS-II FODP with merging of 24F OPGW from other developer at first multi circuit tower. From here 48F OPGW cable shall be terminated/spliced at KPS-II FODP.

i) 24F OPGW cable laying between GIPCL PSS-1 FODP/FODF and GIPCL PSS-2 FODP/FODF.

j) All fibre at KPS-II FODP shall have nomenclature to identify each fibre of OPGW cable from GIPCL PSS-1 and GIPCL PSS-2.

k) SS304 joint box with SS304 clamping/mounting arrangement at actual number and of required capacity as per project requirement shall be supplied and erected.

l) Approach cable laying wherever required shall be supplied and laid. Approach cable shall be laid in HDPE conduit with filling factor of 50%.

m) Number of fibres in approach cable shall be same as number of fibre in OPGW cable.

n) Earthing of all OPGW cable with associate hardware, accessories and fittings to the Earth Pit of each transmission line tower.

2.2.0 The scope of work includes the following:

a) Detailed survey with GPS enable kits, Total Station etc. including preparation of BEE line, reports with all necessary details as asked in particular section under this specification, Check survey and tower location marking, soil resistivity measurement & geotechnical investigation. Detailed geotechnical investigation to be done at tower locations.

b) Based on Geotechnical Investigation report contractor shall design the foundation of the Transmission Line Towers and carryout construction as per approved design

c) Design, Engineering, Fabrication, Proto Testing, Manufacturing, Supply & Delivery of all types of 400kV D/C, 400kV M/C transmission line towers and 400kV Gantry tower(s) with beam/girder (at PSS-1) fully hot dip galvanized considering the high saline zone with minimum zinc deposition of 910 g/m^2(minimum 126 microns at any point of the structure and Averaging shall not be allowed),with stubs, stub setting templates for each type of tower under this package, with all types of tower accessories like phase plate, circuit plate, number plate, danger plate, anti-climbing device, bird guard, earth pipe and counterpoise type earthing as per GIPCL approved design / drawings (prepared & submitted for approval by bidder / contractor for Wind Zone-IV, Seismic zone-V, high saline corrosion zone), including various types of bolts, nuts, fasteners, anti-theft fasteners, step bolt, hangers, D-shackles etc.

d) Supply of Polymeric Insulators, Hardware Fittings, Al59 conductor equivalent to Moose (with highest ampacity, cross sectional area not less than 587 sqmm), OPGW and accessories.

e) Clearing grass & felling trees, as required if any shall be done by contractor/bidder. The necessary approvals for the same shall also be in scope of the Bidder/Contractor.

f) Proto Fabrication, Assembly and Type Testing (non-destructive type) of 400kV Double Circuit towers, 400kV Multi Circuit towers, 400kV Gantry tower with beam / girder shall be in scope of Bidder/Contractor. The design for 400kV D/C towers, 400kV M/C towers, 400kV D/C tower (near PSS-1 take-off) with Auxiliary cross arm shall be either type tested or, shall be of PGCIL / CTUIL approved for Wind Zone-IV & Seismic Zone-V and considering requirements of high saline climatic condition (corrosion zone C5-M).

g) Soil test, wherever found necessary for ascertaining type of foundation including taking pits/bore holes, collecting soil samples and testing at GIPCL approved NABL accredited laboratories as per relevant IS codes.

h) Access roads / routes to the land and locations of towers for erection or, any other purpose shall be arranged by the bidder / contractor without any extra cost to owner.

i) Erection of towers, punching of bolts and nuts, tower earthing including counter poise earthing (if required) and measurement of earth resistance (should be less than 10 Ω), fixing of insulator strings, stringing work of conductors and OPGW along with all necessary line accessories.

j) Painting of towers in bands of red / orange and white (above 45-meter height) and supply & erection of marker balls, obstruction lights (for all towers) for aviation and BSF / Indian Army / Indian Air force / Local Military Authority (LMA) requirement (as this location is near to international border) as per IS 5613.

k) Erection of name boards, phase indicator, number plates, danger boards, Circuit plates, etc. as per standards on all towers.

l) It shall be bidders responsibility for complete coordination with CTU/ISTS substation licensee for works, clearances from substation/project to CTU substation including R.O.W., transmission line route survey, collecting allocated ISTS bay location/co-ordinate details, clubbing of transmission line with other project developers as before entering in to ISTS substation as per applicable connectivity regulation requirements, inputs for prior approval under section 68(1), subsequent approval under sec-1 64 line termination and associated works. Cost associated with all these works shall be borne by bidder. Any coordination works with Gujarat state nodal agency and RLDC as required shall also be the responsibility of bidder.

m) Bidders shall develop the interconnecting Transmission line from the substation end to ISTS substation (KPS-II) as per applicable CEA regulation and CTU standards. For sharing of part of transmission line with other near by Solar Park Developer bidders shall follow CEA standards / CTU standards /Regulations for the construction of Transmission line for that portion.

2.3.0 The following 400kV Towers & Materials shall be included in the scope of the Contractor.

Sl. No.	Item Description
1	400kV D/C Galvanized Lattice towers, Stub & Cleat,stub setting template, Bolt and Nut and all other complete accessories
2	One (1) no. 400kV D/C Galvanized Lattice towers with Auxiliary cross arm (if opted by the bidder) near GIPCL PSS-1, Stub & Cleat,stub setting template, Bolt and Nut and all other complete accessories
3	400 kV M/C Galvanized Lattice tower(s), Stub & Cleat,stub setting template, Bolt and Nut and all other complete accessories
4	400kV Galvanized Lattice Gantry tower (01 Number) with beam / girder (01 Number.), Stub & Cleat,stub setting template, Bolt and Nut and all other complete accessories
5	AL59 Moose conductors (Quad configuration with highest ampacity)
6	Dead End Fitting-single & twin
7	Suspension Clamp – single & twin
8	Mid Span Joint
9	Repair Sleeve
10	Pilot Suspension Clamp
11	Vibration Damper
12	Minimum 120 kN Long Rod Composite Insulator for suspension type and minimum 160 KN for tension type
13	Suspension Fitting-single & twin
14	Tension Fitting-single & twin
15	Pilot Suspension Fitting
16	Tee-Taps with Connectors
17	OPGW 24 Fibre with accessories hardware and fittings
18	OPGW 48 Fiber with accessories, hardware and fittings
19	Single Tension Dead End Fitting
20	Suspension Clamp
21	Double tension set for pass through location
22	Double tension set for Joint Box location
23	Counter weight set
24	Down Lead clamp
25	Joint Box 48 Fiber (SS 304) with clamp/mounting arrangement
26	Joint Box 24 Fiber (SS 304) with clamp/mounting arrangement
27	Reinforcing Rod for damper
28	FODP/FODF
29	Approach cable 24 F
30	Approach cable 48 F
31	HDPE Conduits
32	Pipe Earthing Set 3M (Minimum) with all accessories
33	Counterpoise earthing set complete
34	Galvanized Earth Wire

35	Aviation Paint (as required as per norms/LMA requirements)
36	Aviation Lights (as per ICAO guidelines & LMA requirements)
37	Bird Flight diverter (if applicable/Required)
38	Spacers for AL-59 Quad (Moose Equivalent) conductor.

2.4.0 Any other equipment / items not specifically mentioned in the specification, but which are required for successful erection, testing, commissioning and satisfactory operation and maintenance of the Transmission Line in all respects consistent with the best engineering practices are deemed to be included in the scope.

2.5.0 Supply, Erection, Testing and Commissioning of Junction Box and approach FO cables for both ends of PSS-1, PSS-2 and KPS-II substations.

2.6.0 Testing & commissioning of the erected transmission lines and other items not specifically mentioned in this Specification but are required for the successful commissioning of the transmission line.

2.7.0 Bidder shall furnish all relevant data required by the Owner, at interface points within schedule as agreed prior to award of contract.

2.8.0 The bidder shall be responsible for providing all materials, equipment and services, specified or otherwise which are required to fulfill the intent of ensuring operability, maintainability, and reliability of the total work covered under this specification within his quoted price. This work shall be consistent with modern practice and shall be in compliance with all applicable codes, standards, guides, statutory regulations and safety requirements in force on the date of award of this contract.

2.9.0 The Bidder shall furnish as per Data Requirements, Schedules and other applicable sections, full details regarding all equipment and systems including complete Bill of Materials, Design basis & aspects, drawings, data, information, technical literature and other details required to fully establish the capability and performance of the equipment and systems offered by him. Any bid not containing sufficient details to fully describe the equipment and systems offered or sufficient details regarding past experience for meeting the qualifying requirements may be treated as non-responsive and hence rejected.

2.10.0 Further, the scope shall also include submission, in proper shape & format, of all types of manuals, handbooks & documents in requisite numbers to the Owner at different phases of the project as per the requirement of Owner.

2.11.0 The various items of work are described very briefly in the appropriate price schedule. The various items of the price schedule shall be read in conjunction with the corresponding sections in the Technical Specifications including amendments and, additions, if any. The Bidder's quoted rates shall be based on the description of activities in the price schedule as well as other necessary operations required to complete the works detailed in these Technical Specifications.

2.12.0 The rate quoted shall be inclusive of all plant equipment, men, material skilled and unskilled labour etc. essential for satisfactory completion of various works.

2.13.0 The bidder shall submit their offer taking into consideration that the tower and foundation designs/drawings shall be developed by the bidder themselves / the manufacturer and the design of the towers shall be type tested for wind & seismic zone specified in tender. Preferably PGCIL approved designs for the wind & seismic zone specified in the tender shall be taken as a reference for further manufacturing of towers & foundations.

2.14.0 In case of special type pile or well foundations, some suitable execution agency may be engaged by the contractor for casting of foundations, with the permission of owner / GIPCL. However, the Bidder shall be responsible for all the necessary co-ordination with the special foundation Contractor including stub-setting/fixing of base plate with anchor bolt.

2.15.0 Detailed bill of quantity (BOQ) is listed in Annexure – B.

2.16.0 The items and respective quantities indicated therein are only indicative. Vendor shall include other items not specially indicated in the BOQ but are required for the execution of the contract in the Price Schedules Wherever the quantities of items / works are not indicated, the Vendor is required to estimate the quantity required for entire execution and completion of works and incorporate their price in the respective price schedule. The rate shall remain firm and no escalation is allowed till the end of the contract period.

2.17.0 The scope of supply shall also include the following:
- First fill of consumables, if any
- Mandatory Spares as listed in Annexure-C.
- Special tools for operation & maintenance (O&M) as listed in Annexure-D.

2.18.0 Mandatory spares and special tools & tackles of the Owner shall not be used during commissioning of the equipment. Any spares and special tools and tackles required for commissioning purpose shall be in the scope of the Vendor.

2.19.0 The scope of services shall include the following:
- Preservation, Unloading and storage of all equipment and materials at site
- Construction, Erection, Procurement testing and commissioning
- Preparation and submission of drawings / documents in soft and hard form as per drawing / documentation submission schedule for getting approval from Owner/GIPCL.
- Preparation of Detailed Survey Report (s) for the Transmission Line route with tower spotting, profile and stringing chart etc.
- Submission of Quality Plans and getting them approved by Owner.
- Submission of progress report and timely adherence to the project timeline (which includes all coordination with various vendor for technical details/data interfacing and external agency/regulatory office coordination).
- Participation in project review / technical co-ordination meetings.
- All necessary co-ordination with other vendors / Vendors on site for erection, testing and commissioning of equipment and accessories.
- Overall co-ordination with internal / external agencies. All necessary clearances and approvals by CEI / CEIG, CEA, CTUIL / PGCIL, POSOCO, WRLDC / RLDC / NLDC / LDC's / PESO / GPCL / MNRE-SECI / SLDC / ALDC / STU / DISCOM or, any other statutory bodies, forest department etc. including fees/charges/registration (including charges) related to this package.
- Preparation and submission of all as-built drawings in soft (including editable source files) and hard copies.
- Obtaining Owner's approval and written acceptance of satisfactory performance
- Handing over of installation for commercial operations
- Collection of all site related data
- Soil investigation including electrical soil resistivity measurements.
- Construction power and water facilities shall be bidder's responsibility.
- Civil works incidental to the erection of gantries, beam structures & towers.

3.0.0 CODES AND STANDARDS

3.1.0 The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest version of the relevant IS / IEC standards including amendments, if any, except where modified and / or supplemented by this specification.

3.2.0 In above all, bidder shall also follow the below **CEA / CERC guidelines / regulations and its' latest amendments:**

1	CERC	Connectivity and General Network Access to Interstate transmission system Regulation 2022 (Including document on "formats of technical data for connectivity agreement" issued by CTUIL and "Detailed Procedure for Connectivity and General Network Access (GNA) to the ISTS" as per CERC order dated 14th October 2022) and as amended time to time.
2	CEA	Technical Standards for Connectivity to the Grid Regulations, 2007, 2013, 2019 and as amended time to time
3	CEA	Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters Regulations, 2009, May 2018, Feb-2021 and as amended time to time
4	CERC order	Detailed Procedure For "Grant of Connectivity To Projects Based On Renewable Sources To Inter-State Transmission System.
5	CEA-PSETD	Guidelines for Availability of Spares And Inventories For Power Transmission System (Transmission Lines & Substation/Switchyard) Assets as amended time to time
6	CEA	Guidelines for Model Quality Assurance Plan (MQAP) for major equipment of Power sector as amended time to time.
7	CEA	Technical Standards for Communication System in Power System Operations) Regulations, 2020 and as amended time to time
8	CEA	Grid Standard Regulation 2010 and as amended time to time
9	CEA-PCD	Various Recommendation of 'Standing Committee on Communication System Planning in Power Sector'.
10	CERC	Indian Electricity Grid Code regulation 2006, 2010 and draft 2022 and as amended time to time
11	CEA	National Power Committee recommendation from time to time.
12	CEA	Safety · Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011 and 2022
13	CEA	Measures relating to Safety and Electricity Supply Regulations, 2010,2015,2018,2019 and Draft Regulation 2022.
14	CEA	Technical Standards for Construction of Electrical Plants and Electric Lines Regulation 2022.
15	CEA	Manual On Transmission Planning Criteria, 2023.
16	CEA	Draft Procedure for coordinated transmission planning through the Regional Standing Committees for Power System Planning.
17	POSOCO	Consolidated procedure for first time charging / Energization (FTC) and integration of New or modified power system element-June-20.

18	CEA	Guidelines for the Validity Period of Type Test(s) Conducted On Major Electrical Equipment In Power Transmission
19	CERC	Indian Electricity Act-2003, Indian Electricity Bill, 2022.
20	CEA	Technical Specifications for Bird Flight Diverter
21	CEA	Procedure for "Grant of Connectivity to projects based on Renewable Sources to inter-State transmission system" amended / revised time to time.
22	CEA	Compendium of Tested Tower Designs for EHT Transmission Lines- March 2018
23	CEA	Guidelines for the Validity Period of Type Test(s) conducted on Major Electrical Equipment in Power Transmission System
24	CEA	Guidelines for Rationalized use of High-Performance Conductors February 2019.
25	CEA	Draft Central Electricity Authority (Construction of Electric Lines in Great Indian Bustard Area) Regulations, 2023
26	CEA	Measures relating to Safety and Electricity Supply Regulations, 2010.,2015,2018,2019, Draft 2022 and as amended from time to time.
27	-	Any other CEA/CERC/IE/Grid regulations.
28	IS 269	Ordinary Rapid and Low Heat (ISO/R/597-1967 Portland Cement
29	IS 383	Coarse and Fine Aggregates from natural sources for concrete (CSA A 23.1/A 23.2)
30	IS 4091 ASCE / IEEE 691	Code of Practice for design & construction of foundation for Transmission line tower and Poles
31	IS:1139- 1966 CAN / CSA G 30 18	Hot rolled mild steel medium tensile steel and high yield strength deformed Bars for concrete reinforcement
32	IS:432 CSA-G-30 (Part 1 & 2)	Mild steel and medium tensile bars and hard drawn steel wire for concrete reinforcement
33	IS:456- 1978	Code of practice for plan and reinforced concrete
34	IS:1489- 1991 ISO/863-1968	Portland Pozzolena Cement
35	IS:1786- 1985	High strength deformed steel bars and wires for concrete reinforcement
36	IS:2131- 1967 ASTM D 1883	Method of Standard penetration test for soils.
37	IS:5613 (Part-II) 1985	Code of practice for Design, installation & maintenance of overhead power Lines
38	IS 800-1991	Code of Practice for General building, Construction in Steel

4.0.0 EXCLUSIONS

The following items of work are specifically excluded from the scope of the specifications:

- 400/33 kV GIPCL PSS-1 (except Gantry Tower with beam/girder at PSS-1 for interconnection between PSS-1 & 2) and all downstream associated system.
- 400/33 kV GIPCL PSS-2 and all downstream associated system.
- 765/400kV CTU Khavda-II Substation, Kutch of Rann, Gujarat.
- Any work related to Solar/Wind Power plant end at GIPCL Hybrid RE Park.
- Insulators, conductors, associated hardware and OPGW of other developer.

5.0.0 TERMINAL POINTS

- 400kV S/C line of Quad Al59 Moose conductor shall be terminated at the outgoing line bay gantry tension insulators of PSS-1 & 2 by Transmission line contractor. PSS-1 and PSS-2 bay side droppers from line conductors to associated AIS bay equipment's are not in scope of transmission line vendors, however its installation / termination shall be carried out by transmission line contractor. Required tension insulators and associated hardware (s) are in scope of transmission line contractor.
- 400kV D/C lines of Quad Al59 Moose conductor shall be terminated at the incoming line bay gantry tension insulators of CTUIL Khavda-II Substation (KPS-II). Tension insulators, droppers from line conductors to associated AIS equipment with associated hardware (s) are in scope of transmission line contractor as per CTUIL / KPS-II requirements.

- 400kV Gantry Tower (01 no) with Beam (Girder) (01 no.) at PSS-1 including jumpers required for testing / charging of line between PSS-1 and PSS-2 (as this line is not equipped with switchgears at both ends) at suitable location. (Jumpers are to be installed temporarily and to be removed after successful completion of activity)
- OPGW cable termination/splicing at FODP of PSS-2, PSS-1 and KPS-II.
- OPGW cable jointing in SS 304 joint box.
- OPGW cable with associated hardware, accessories and fittings connected to the Earth Pit of each transmission line tower.

6.0.0 GENERAL REQUIREMENTS

6.1.0 Project information is given in **Annexure – A.**

6.2.0 The Vendor shall fully familiarize himself with the site conditions. The Vendors are advised to visit the site from PSS-1 & 2 at GIPCL end till CTUIL Khavda-II (KPS-II) grid substation for the Transmission Line path and acquaint themselves with the topography, terrain and infrastructure. The successful bidder (Vendor) shall be fully responsible for providing all equipment, materials, system and services which are required to complete the construction and successful commissioning, operation and maintenance of the 400kV Transmission Line in all respects.

6.3.0 The Vendor shall obtain and pay for all permits, licenses, tree cutting, bush cutting, debris removal and statutory approvals from local authorities for completion of work. Original copies of these approvals shall be delivered to the Owner or his authorized representative and will become property of the Owner. It must be understood and agreed that such factors have properly been understood and considered while submitting the bid. No claim whatsoever shall be entertained by the Owner. Neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Owner.

6.4.0 The tree cutting shall be responsibility of contractor. The contractor shall count, mark end put proper numbers with suitable quality of paint at his own cost on all the trees that are to be cut. Contractor may note that owner shall not pay any compensation for any loss or damage to the properties or for tree cutting due to contractor's work. The cost of cutting the trees, staking of cut trees, logging of trees, clearing debris and transportation of cut trees (if required) shall be borne by the contractor. Tree enumeration and obtaining tree falling permission are included in the scope of contractor.

6.5.0 All materials and equipment furnished for permanent installation shall be new, unused and undamaged. In case of cement, the same shall be within expiry time line and good loose in condition.

6.6.0 The Vendor shall adopt suitable numbering system to provide identification numbering. All towers & accessories like phase plate, circuit plate, number plate, danger plate, shall be

permanently identified. All plates shall be of SS-304 material, engraved letters shall be visible from at least from 3 meters distance.

6.7.0 In addition, two (2) coats of bituminous painting of minimum 1.6kg/m^2 per coat shall be applied on all exposed faces of foundation (i.e. pedestal & base slab). Double coat 20mm thick cement plaster shall be provided on all exposed concrete surface as well up to 300mm below ground level to give protection to concrete surface from environmental and saline effect.

6.8.0 Before coping of chimney top portion, three coats of anti-corrosive paint of minimum 30-35 microns dry film thickness each shall be applied on the slab in the 50mm coping portion as well as up to 350mm above CL portion.

6.9.0 The Vendor shall be responsible for safety of human and equipment during working. It will be the responsibility of the Vendor to co-ordinate and obtain Electrical Inspector's clearance before commissioning. Any additional items and modifications due to observation of such statutory authorities shall be provided by the Vendor at no extra cost to the Owner.

6.10.0 Required **construction power and construction water** shall be arranged by bidder only.

6.11.0 The Vendor shall arrange stores for storing all the equipment including tower parts, insulators, conductors, hardware fittings, civil raw materials etc. during construction & erection activities. All equipment during storage shall be protected against damage due to acts of nature or accidents. The storage instructions of the equipment manufacturer / Owner shall be strictly adhered to.

6.12.0 Tentative transmission line route layout / path is enclosed herewith the specification for reference. List of these drawing is given in Annexure – F. The transmission line package/system shall be engineered further during detail engineering.

6.13.0 All drawings, schedules and annexure appended to this specification shall form part of the specification. These drawings are conceptual and indicative and meant to give a general idea to the Bidder / Vendor. No information / data shown / not shown in these drawings shall be construed to relieve the Vendor of his responsibility to carry out the work as per this specification and / or construction drawings released during detail engineering.

6.14.0 In case of any discrepancy between the drawings and text of specification, the stringent one shall prevail. Further, Vendor is advised to get these informed to the Owner.

6.15.0 All required approvals and coordination for shutdowns of existing lines / road crossings from concern authorities, if any during erection of GIPCL's lines is in scope of EPC contractor.

6.16.0 All the equipment and accessories covered under this specification shall be designed, manufactured, and tested in accordance with the latest revision of the standards mentioned in the tender document. They shall also conform to the requirements of latest editions / amendments of the following:

- Indian Electricity Act and rules framed there-under
- Fire insurance regulations
- Regulations laid down by the office of the Chief Electrical Inspector to Government
- CEA guidelines / regulations / manual / draft regulations/ circulars / Office Memorandum etc.
- NFPA guidelines
- CBIP manual on Transmission Line
- Any other regulations laid down by the local / central authorities.

6.17.0 Work to be commenced as per Owner's requirement (e.g. to be started from CTUIL end / GIPCL end etc.).

6.18.0 All statutory clearances / approvals are in scope of Contractor including required registration process and cost associated with all this work shall be borne by the contractor.

- CEA Clearance u/s 164 of Electricity
- Application of Transmission License u/s 15 of Electricity Act (before commencing work) – to be obtained from CERC (If applicable)
- Getting recommendation and guidelines from CTU/STU by forwarding the Transmission License Application
- Approval under Section 68
- Electrical inspector drawing approval
- Electrical inspector installation inspection and its approval.
- PTCC clearance / approval
- NOC for Power Line crossing. (Owner of the crossing lines or any other authority)
- Highway / GAS / Oil line / Any other similar service crossings clearances / approval.
- Forest department clearance / approval from MoEF.
- NOC from Dept. of Civil Aviation.
- Any other approval / clearance required.

6.17.0 Ampacity and MVA capacity of transmission line system at various ambient temperature, conductor temperature wind speed etc. shall be provided with calculations in excel.

6.18.0 Other Developer's lines are of ACSR Quad moose conductor.

7.0.0 GALVANIZING AND PAINTING

7.1.0 All tower structures, bolts, nuts and accessories shall be hot dip galvanized. Thickness of galvanizing shall not be less than 910 gm/sq. m. (minimum 126 microns, at any point of the structure, Averaging shall not be allowed) as the site of transmission line is in saline environment.

7.2.0 The galvanized surfaces shall consist of a continuous and uniformly thick coating firmly adhering to the steel surface. The finished surface shall be clean and smooth and free from defects.

7.3.0 Galvanization and Painting including Aviation painting of towers (as mentioned / detailed in specification) shall be done considering the requirements and recommendations for high saline C5-M zone as per ISO 12944.

8.0.0 PACKING

8.1.0 All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site. The Vendor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

8.2.0 The successful Bidder / Contractor shall prepare detailed packing list of all packages & containers, bundles & loose materials forming each & every consignment dispatched to 'Site'. All packing details with packet identification number shall be sending in soft copy to owner.

8.3.0 All coated surfaces shall be protected against abrasion, impact, discoloration and any other damage. Surfaces which are damaged shall be replaced.

8.4.0 The successful bidder shall prepare detailed packing list of all packages, containers, bundles and loose materials forming each and every consignment dispatched to 'Site'.

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

8.6.0 Each package shall be legibly marked by the Contractor at his expenses showing the details such as description and quantity of contents, the name of the consignee and address, the gross and net weights of the package, the name of the Owner (i.e. GIPCL), name of the Contractor etc.

8.7.0 Angle section shall be wire bundled. Conductors shall be in proper wooden / metal drums.

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

9.0.0 QUALITY ASSURANCE & INSPECTION

9.1.0 Proto Fabrication, Assembly and Type Testing (non-destructive type) of 400kV Double Circuit towers shall be in scope of Bidder/Contractor. The design for 400kV D/C towers shall be either type tested or, shall be of PGCIL approved for Wind Zone-IV (or as applicable) & Seismic Zone-V and considering requirements of high saline climatic condition.

9.2.0 Towers and other equipment offered shall be of type tested and proven type. In case type test reports are not found to be meeting the specification requirements, Vendor shall conduct, free of cost to the Owner, all such type tests according to the relevant standards.

9.3.0 Vendor list is given in **Annexure- E**.

9.4.0 The Vendor shall adopt suitable quality assurance program to ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Vendor's works or at his sub-Vendor's premises or at the Owner's site or at any other place of work are in accordance with the specification. Such program shall be outlined by the Vendor and shall be finally accepted by the Owner / authorized representative after discussion. The quality assurance (QA) program shall be generally in line with ISO 9001.

9.5.0 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all stages, as per a comprehensive QA program. It is the Vendor's responsibility to draw up and implement such program duly approved by the Owner.

9.6.0 Manufacturing quality plan (MQP) shall detail out for all the components and equipment, various tests / inspections to be carried out as per the requirements of this specification and standards mentioned therein, quality practices and procedures followed by Vendor's / sub-Vendor's quality control organization, the relevant reference documents, acceptance norms etc. during all stages of manufacturing including raw material procurement, in-process manufacturing, assembly and final testing / performance testing. The quality plans shall be submitted to Owner in soft form for review and comment. Hard copies of final quality plans shall be submitted for stamping and approval in addition to soft copies.

9.7.0 Field quality plan (FQP) shall detail out for all the equipment, the quality practices, procedures etc. to be followed by the Vendor's 'site quality control organization', during various stages of site activities starting from receipt of materials / equipment at site.

9.8.0 The Vendor shall carry out inspection and testing of components and equipment during manufacture at his works, at his sub-Vendor's works and at site to ensure compliance with the specification, quality and conformance to functional and performance requirements.

9.9.0 The Vendor shall carry out all tests / inspections required to establish that the items / equipment conform to the requirements of the specification and relevant codes / standards specified in the specification, in addition to carrying out tests as per the approved quality plans. Quality audit / surveillance / approval of the test results and inspection and acceptance of material will not, however, prejudice the right of the Owner to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service. Also they shall not limit the liabilities and responsibilities of the Vendor in ensuring complete conformance of the materials / equipment supplied to relevant specification, standards, data sheet, drawing etc.

9.10.0 The sub-vendor whose equipment are offered shall have designed, manufactured, tested and supplied the same for the specified system voltage and which are in satisfactory operation for at least five (5) years as on date of bid opening.

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

9.12.0 Repair / rectification procedures required, if any, shall be subject to the approval of the Owner / authorized inspection agency.

9.13.0 Before dispatching structures from fabrication shop, proto-type of each structure shall be shop assembled and checked for fabrication tolerance. Also, if desired by the Owner, the same shall be presented for inspection and testing at an approved testing facility.

9.14.0 CEA Guidelines for Model Quality Assurance Plan (MQAP) for major equipment of Power sector shall be considered as minimum requirement i.e. over and above plans / test specified in this tender document.

10.0.0 GUARANTEE

10.1.0 Vendors shall guarantee that system engineered and equipment offered shall meet the requirements as stipulated in this specification and as confirmed by them in technical data sheets.

10.2.0 All manufacturers' guarantees for all bought out items / equipment etc. shall be made available to the Owner and shall be valid for the entire liability period. If such guarantees are not issued by manufacturer, the Vendor shall guarantee the bought out items for the entire defects liability period along with his guarantee for the plant as a whole.

10.3.0 In the event of failure of any particular equipment which fails more than three times during the guarantee period, the Vendor shall replace the entire equipment at his own cost with another equivalent make as approved by Owner. Manufacturer's / Vendor's guarantee, as mentioned for such replaced equipment shall also be made available to the Owner and shall be kept valid at least for one year from the date of last replacement at site.

11.0.0 TIME SCHEDULE

The following shall be the schedule for completion of work for this package which shall be from the date of issue of order:

Work	Schedule

Survey, Design, engineering, manufacture, testing, transport and delivery at site, storage at site, erection, testing and commissioning of overall transmission system for 400 kV, 2375 MW Park with 400 kV Single Circuit Transmission Line between 400/33 kV PSS-1 and PSS-2 to CTUIL KPS-II S/s on double circuit towers with last 500 meters (approximately) on multi circuit tower(s), 400 kV Single Circuit Transmission Line between PSS-2 to CTUIL KPS-II S/s on double circuit towers with last 500 meters (approximately) on multi circuit tower(s), 400 kV Single Circuit Transmission Line between PSS-1 to PSS-2 on double circuit towers with auxiliary cross arm (if applicable). One (1) gantry tower with one girder (beam) at PSS-1 for transmission line between PSS-1 to PSS-2. All transmission lines with AL59 Quad Moose conductor (cross sectional area of AL59 moose conductor with highest ampacity with minimum cross-sectional area of 587 sq.mm.)	10 months including monsoon season from date of LOI

12.0.0 DRAWINGS, DATA AND MANUAL

12.1.0 **To Be Submitted Along with Bid in three hard copies and soft copy in USB pen drive**:

- Technical offer
- Technical schedules duly filled up and stamped and signed on all the sheets.
- Type test certificate of similar type of towers and conductors.
- Catalogs/drawings leaflets for major items

12.2.0 **To Be Submitted After Award of Contract:**

The minimum requirements of data, drawings and instruction manuals for this package as listed below, in addition to the requirements of various clauses of Technical Specification, and other applicable Sections to be submitted in multiple copies to the Owner. All communications in the drawings, documentations, technical literatures and manuals will be in English language. The Bidder shall prepare an exhaustive Master Drawing List (MDL) of all drawings/documents/ manuals to be submitted during detailed engineering stage (including those from sub-Bidders). The MDL shall contain drawing/document no., rev. no, title, scheduled date of submission, actual date of submission, approval status (Category & date), etc. The exact format shall be as approved by Owner. The Bidder shall furnish the MDL to Owner before Notification of Award (NOA). This shall be discussed and finalized during pre-award discussions. The MDL will be modified by Bidder periodically to take care of detailed engineering requirements. The MDL shall be submitted by Bidder for Owner's information every month with latest status.

- Master Work Plan / Schedule
- Detail Survey report and profile drawings showing ground clearance and tower locations.
- Tower Schedule and foundation classification for individual tower locations.
- An exhaustive Master Deliverable List (MDL) for drawing & documents
- Technical data sheet
- Link Budget Calculation as per CEA regulations
- List of deliverable items & packing list.
- Bill of quantity
- Documents as listed in various sections
- Detailed erection and commissioning procedure
- Stringing procedure
- Tower accessories drawings like danger plate, name plate, phase plate, circuit plate, pipe and counter poise type earthing etc.

- Test procedures
- Type test certificates for all line equipment / materials
- Manufacturing quality plan
- Field quality plan
- O&M manual
- As-built drawings
- Any other drawings / documents listed in respective equipment sections.
- Any other drawing / documents/ details/ parameters required by the owner during detail engineering.

12.3.0 **Drawing / documents distribution schedule will be firmed-up during finalization of Contract.**

12.4.0 For all technical tables and diagrams, calculation results, drawings, test data and scales adopted in the design, the Standard International unit system (SI) as per International Standardization Organization (ISO) shall be uniformly employed.

12.5.0 All engineering documents and drawings shall be of international "A" series sizes (A0, A1, A2, A3 and A4).

12.6.0 All engineering drawings shall be supplies as AutoCAD soft copies.

12.7.0 All calculation (except special design software) shall be provided in excel file, list, schedules shall be provided in excel file.

13.0.0 OTHER REQUIREMENTS

13.1.0 Basic issues to be taken care while carrying out the construction activities are:

a) Avoid environmentally and socially sensitive areas while planning the project activities.
b) Apply efficient and safe technology / practice.
c) Keep abreast of all potential dangers to people's health, occupational safety and safety of environment and the respective mitigation measures.
d) Establish preventive mechanism to guarantee the safety
e) Avoid unwanted cutting of trees
f) Minimum disturbance and minimization of impacts especially for local wild animals or, any other livestock.

13.2.0 The waste/excess material/debris should be removed from the construction site including forest / bush stretches, canal etc. immediately after construction work. The Contractor shall ensure least disturbance to the hill slope and natural drainage so as to avoid soil erosion. Natural drainage in plain area if disturbed is to be restored to the satisfaction of Engineer-in-charge. As far as possible, existing path road/ approach shall be used for the construction. The Contractor shall ensure supply of stone chips/sand from authorized/approved quarry areas, proper documentation of above, if any.

13.3.0 Obtaining all the statutory approvals including permission for first time charging (FTC) of transmission line shall be in scope of bidder / contractor.

13.4.0 Deleted

13.5.0 Access roads/ routes shall be identified by the Contractor themselves as and where necessary and shall be constructed by them at their own expense.

13.6.0 The contractor shall try to avoid the crossing of other power lines, telecommunication towers etc. public utilities so that the construction time & approval time can be reduced.

13.7.0 Any damage happened to any public or, private property during the construction activities by the contractor, then the same shall be compensated by the contractor himself and no claim is tenable to owner in that case.

13.8.0 The contractor shall be penalized by the law of the land if found liable for any injury to or loss of livestock due in the opinion of the Engineer In-Charge to failure to comply.

ANNEXURE-A: PROJECT INFORMATION

1.0.0	Owner	:	Gujarat Industries Power Company Limited
1.1.0	Owner's Engineer	:	FICHTNER Consulting Engineers (I) P Ltd
1.2.0	Project	:	2375 MW Solar/Wind/Hybrid RE Park
1.3.0	Site location	:	Khavda Village, Great Rann of Kutch, District Bhuj, Gujarat
1.4.0	Nearest Airport	:	Bhuj
1.5.0	Nearest Railway Station	:	Bhuj

2.0.0 Meteorological Information

2.1.0	Ambient temperature		
	Extreme high	:	50°C
	Extreme low	:	9°C
2.2.0	Design ambient temperature for electrical equipment	:	50°C
2.3.0	Relative humidity for design	:	95%
2.4.0	Basic wind speed and wind pressure	:	47 m/s, 1073 n/M2
2.5.0	Seismic Zone	:	Zone – V as per IS 1893
2.6.0	Corrosion Zone	:	C5-M as per ISO 12944 (Severe as per Corrosion Advisory Bureau, Metals Research Committee, CSIR)
2.7.0	Isokeraunic level	:	82 days/years
2.8.0	Distance between PSS-1 & 2	:	5.0 km (Approx.)
	Distance between PSS-1 to KPS-II	:	9.5 km (Approx.)
	Distance between PSS-2 to KPS-II	:	14.5 km (Approx.)

3.0.0 Electrical Details

3.1.0	Electrical voltage levels		
	a) Power frequency	:	50Hz (+)3% to (-)5%
	b) EHV system	:	400 kV (±)5% volts, 3 phase, solidly earthed system
3.2.0	Short circuit levels		
	a) 400 kV system	:	63kA for 3 seconds

ANNEXURE- B: BILL OF QUANTITY

Sl. No.	Item	Unit	Quantity
	Survey, Design, Procurement, Supply, Delivery, Storage, unloading, loading, transportation, handling at site, Construction, Erection, Testing & Commissioning of followings systems.		
1	400 kV, D/C Transmission Line from GIPCL PSS-2 to PSS-1 to CTUIL Khavda-II (KPS-II) on double circuit towers (with two peaks) as per Tender specifications	Km	14.5
2	400 kV, D/C lines on M/C Transmission tower (before entering to CTU Khavda-II GSS) Only D/C Lines for GIPCL shall be installed by the bidder and another 02 circuits of M/C tower will be installed by other developer. (Conductor, Insulators, OPGW and associated hardwares except tower structure and foundation)	Km	0.5
3	400 kV M/C Transmission Tower Structures and foundation (before entering to CTU Khavda-II GSS end) as per Tender specifications.	Nos	2
4	400kV Gantry Tower structure and Beam structures (Girder) at GIPCL PSS-1 (for transmission line between PSS-1 & 2) including all hardwares as per given in the tender specifications.	Lot	01
5	24 F OPGW including Joint Boxes, associated hardware, accessories and fittings etc. on 400kV, D/C Transmission Line on two peaks as mentioned in the Tender speficications (PSS-2 to KPS-II for one peak and PSS-1 up to M/C Tower another peak)	Lot	01
6	48 F OPGW including Joint Boxes, associated hardware, accessories and fittings etc on 400kV, M/C Transmission line on one peaks as per tender specifications (One Peak from M/C Transmission line to KPS-II)	Lot	01
7	Approach cable 24F	Lot	As per requirement
8	Approach cable 48F	Lot	As per requirement

ANNEXURE- C: MANDATORY SPARES

Sl. No.	Item	Unit	Quantity
1	Anti-theft Galvanized nut bolts & washers of each type and size	Lot	5% of used each length / size
2	AL59 Moose Conductor (Conductor pieces are not accepted.)	Lot	5% of used conductor length or, 18.0 Km whichever is less. In standard drum length.
3	OPGW 24 F	Lot	2 Drums
4	OPGW 48 F	Lot	1 Drum
5	Composite Long Rod Insulators – 120KN (Suspension)	Strings	18
6	Composite Long Rod Insulators – 160KN (Tension)	Strings	12
7	Hardware Fittings for Conductor	Lot	5% of used each type fittings or, for 2Km circuit line length whichever is less.
8	Hardware Fittings for OPGW	Lot	5% of used each type fittings or, for 2Km line circuit length whichever is less.
9	Bird Flight Diverter (If applicable)	No	10% of Total Quantity
10	Joint Box 24F (SS 304)	No	1
11	Joint Box 48F (SS 304)	No	1
12	Approach cable 24F	Lot	Highest length used, 1 no
13	Approach cable 48F	Lot	Highest length used, 1 no
14	Aviation Light	Lot	10%

ANNEXURE- D: SPECIAL TOOLS

All special tools shall be suitable for 400 kV transmission system and shall be of reputed make with standard warranty. Make shall be approved by the owner during detail engineering (wherever make is not mentioned)

Sl. No	Item	Unit	Quantity
1	Transmission Tower Tool box (with tools) of reputed make	Set	2
2	Torque wrench of reputed make	Nos	2
3	Safety Kit - Helmet, Shoes, gloves, reflective jacket	sets	10
4	Safety harness of reputed make	Nos	4
5	HV neon Tester of reputed make	Nos	2
6	Binocular – ZEISS 10x54 Victory HT with all standard accessories, OEM carrying case etc.	Nos	1
7	High intensity torch: FENIX LR80R with all standard accessories (45-W fast charger, USB-C Charging Cable, Shoulder Strap, hanging ring screw, spare O ring, user manual, carrying case etc.).	Nos	2
8	High intensity torch: IMALENT MS18 with all standard accessories (fast charger, USB-C Charging Cable, Shoulder Strap, hanging ring screw, spare O ring, user manual , carrying case etc.).	Nos	2
9	Come along clamps with Winch	Nos	2
10	Compression Machine with Die	Nos	1
11	Winch	Nos	1
12	Steel Rope (50m)	Bundles	3
13	PP Rope of 1 kM (With highest diameter used during erection work)	Bundles	3
14	Conductor Sheave (Pully)	Nos	4
15	Four sheave sagging pully	Nos	2
16	Optical Attenuators (variable 1310/1550nm). JDSU OLA55	No	1
17	Optical Power meter (1310/1550nm) with Laser Source. JDSU OLP55	No	1
18	Optical test accessory kit including all necessary connectors, adaptors, cables, terminations and other items required for testing (FIS – FI-0053-TS-ST)	No	1

ANNEXURE–E: VENDOR LIST

Sl. No.	Equipment	Vendor
1.	Tower Structures (HT & MS) and BNA	a) KEC International Ltd. b) Kalpataru Power c) Skipper Limited d) Utkarsh Tubes e) Vijay Transmission Pvt. Ltd., f) R R Ispat, Raipur g) Pragati Electrocom (P) Ltd. h) Nexo Industries i) Supreme & Co. j) Associated Power Structures Pvt. Ltd k) Bajaj Electricals Ltd. l) Unitech Power Transmission m) Vishal Engineers & Galvanizers Pvt. Ltd. n) Jyothi Structures o) L&T
2.	Tower Accessories i) Phase plate ii) Danger board iii) Circuit plate iv) Number plate v) Anti-climbing device etc.	a) KEC International Ltd. b) Ashoka Tools, Kolkata c) Skipper Limited d) Utkarsh Tubes e) Vijay Transmission Pvt. Ltd., f) R R Ispat, Raipur g) Pragati Electrocom (P) Ltd. h) Nexo Industries i) Supreme & Co. j) Ratan Projects k) Aumni Transmission Pvt. Ltd. l) Gayatri Metalic Foundary
3.	Composite Long Rod Insulators 120KN & 160KN	a) Aditya Birla Insulators b) WS Industries (India) Ltd. c) BHEL, Bangalore d) Deccan Enterprises Pvt. Ltd. e) Spark Insulators, Chennai f) Yamuna (Densons), India g) Olectra Greentech Pvt. Ltd.
4.	AL59 Moose Conductor	a) Sterlite Power b) Apar Industries Ltd. c) JSK Industries Pvt. Ltd. d) Lumino Industries Ltd. e) Dynamic Cables Ltd.
5.	Hardware fittings for Conductor	a) Supreme & Co. b) Rashtraudhyog Ltd. c) IAC Electricals d) TAG Corporation e) Swamiji Transmission Pvt. Ltd. f) KSE Electricals Pvt. Ltd. g) Mosdorfer h) ITL i) Karamtara

Sl. No.	Equipment	Vendor
		j) Asbesco
6.	OPGW	a) Sterlite Technologies Ltd. b) ZTT India Pvt. Ltd., Andhra Pradesh c) Apar Industries d) LS Cable (India / Korea) e) TG Advait India Pvt Ltd
7.	Approach Cable	a) Finolex b) Aksh c) HFCL d) Sterlite e) KEC f) APAR g) M/S Birla Cables h) R&M (Switzerland) i) Molex (UK) j) PGCIL Approved Vendor k) Corning (USA
8.	Hardware fittings for OPGW	a) Supreme & Co. b) IAC Electricals c) TAG Corporation
9.	Joint Box (SS 304)	• PGCIL approved
10.	Earthing Material (Pipe & Counterpoise)	a) H. S. Engineering b) Vishal Pipe c) Balarka Fabricon d) Ratan Projects e) Supreme & Co. f) Utkarsh Tubes g) Nexo industries h) Ashoka Tools, Kolkata i) Ashlok j) ERCO k) JEF Techno
11.	Aviation Lights	a) Aviation Power Systems, Faridabad b) J.B. Industries, New Delhi c) Binay Opto Electronics Private Ltd. d) Instapower Ltd. e) Geltronix f) Avaids Technovators Pvt. Ltd.
12.	TMT Rebar FE550D-CRS	a) SAIL b) TATA Steel c) RINL d) Jindal Panther or, equivalent of JSPL e) JSW
13.	Cement SRC/PSC) OPC WITH MIN 50% SLAG	a) ACC b) UltraTech c) Ambuja d) JSW Cement e) Nuvoco (Lafarge)

Sl. No.	Equipment	Vendor
		f) Ramco g) J K Laxmi h) Any other GIPCL approved make. i) Siddhi j) HI-Bond
14.	Bird Diverter	k) Indolite l) Welkin m) BT Enterprises n) Winsol

NOTES:

1. The final make selected out of the recommended makes listed above shall be subject to the Owner's approval during detailed Engineering.

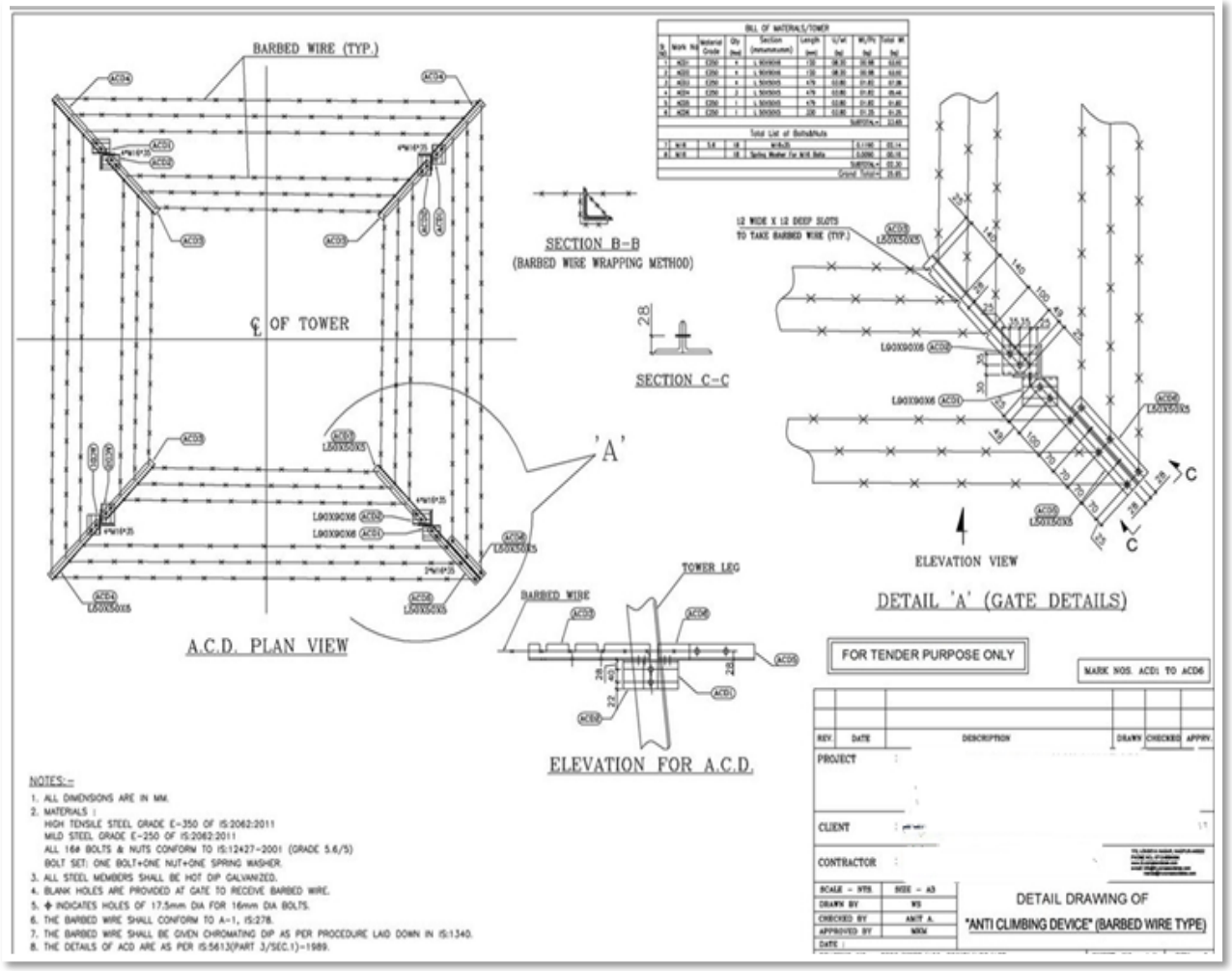
2. Wherever the make is not specified for any other items, the contractor shall submit credential for vendors for relevant items / equipment, out of which Owner shall decide acceptance of vendor based on review of credentials. This shall have no price implication. Owner reserves the right to reject the proposed vendor without assigning any reason.

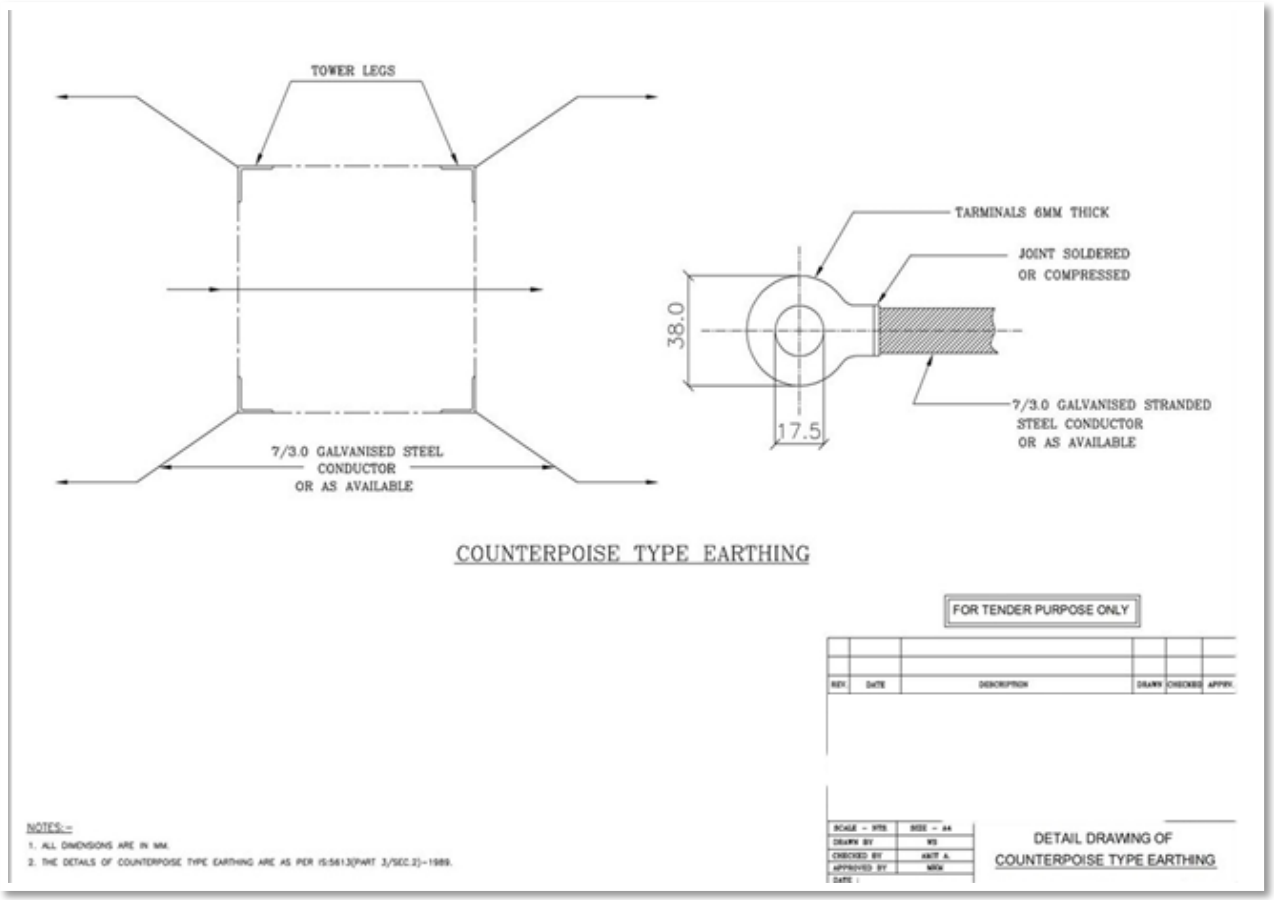
3. Bidder may suggest /request for approval of Additional vendor with credentials and details for review and approval of Owner. Owner may consider the request in case proposed additional vendor is reputed and meeting the tender specification requirements. Owner reserves the right to reject the proposed vendor without assigning any reason.

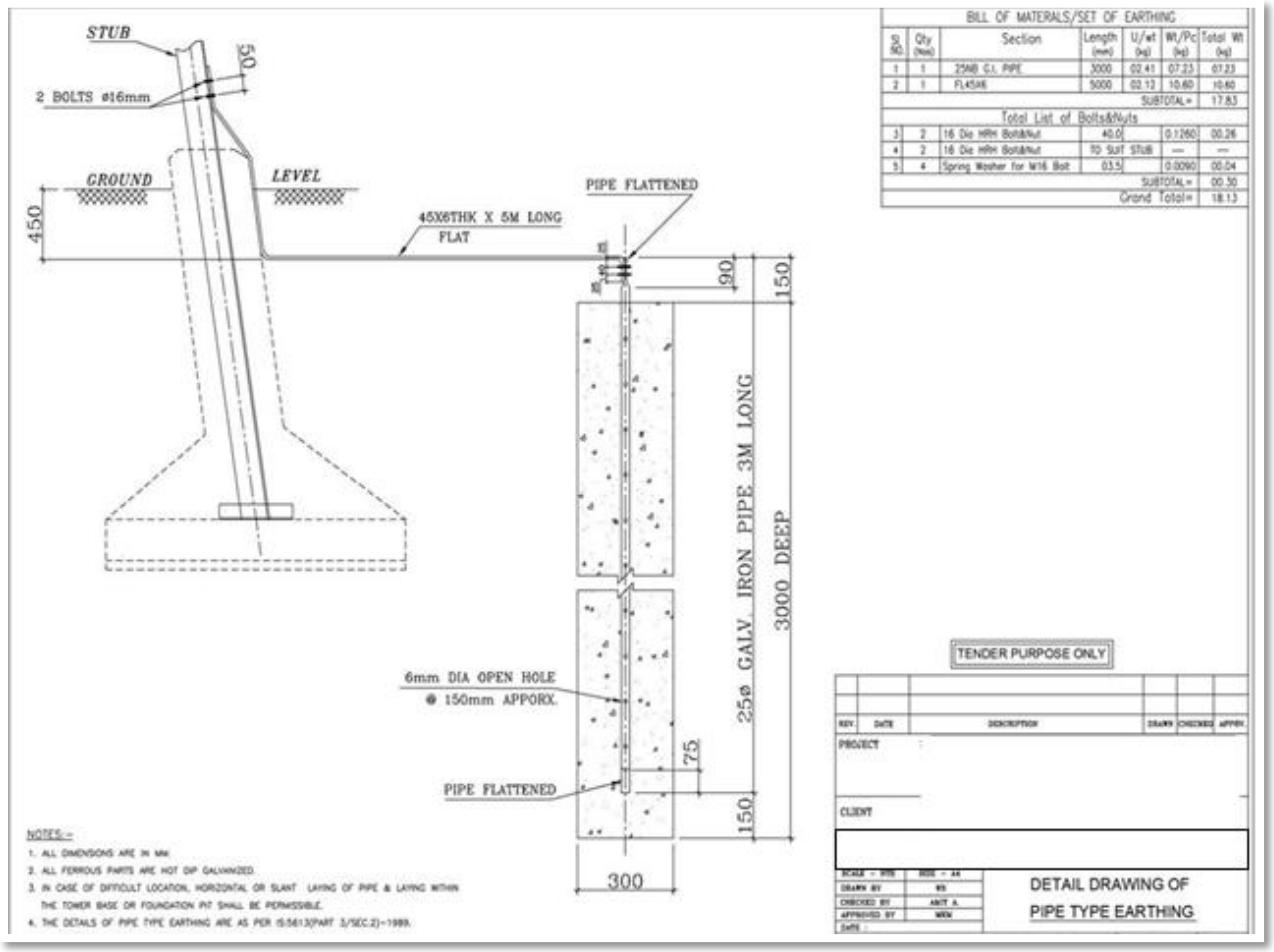
ANNEXURE–F: LIST OF DRAWINGS

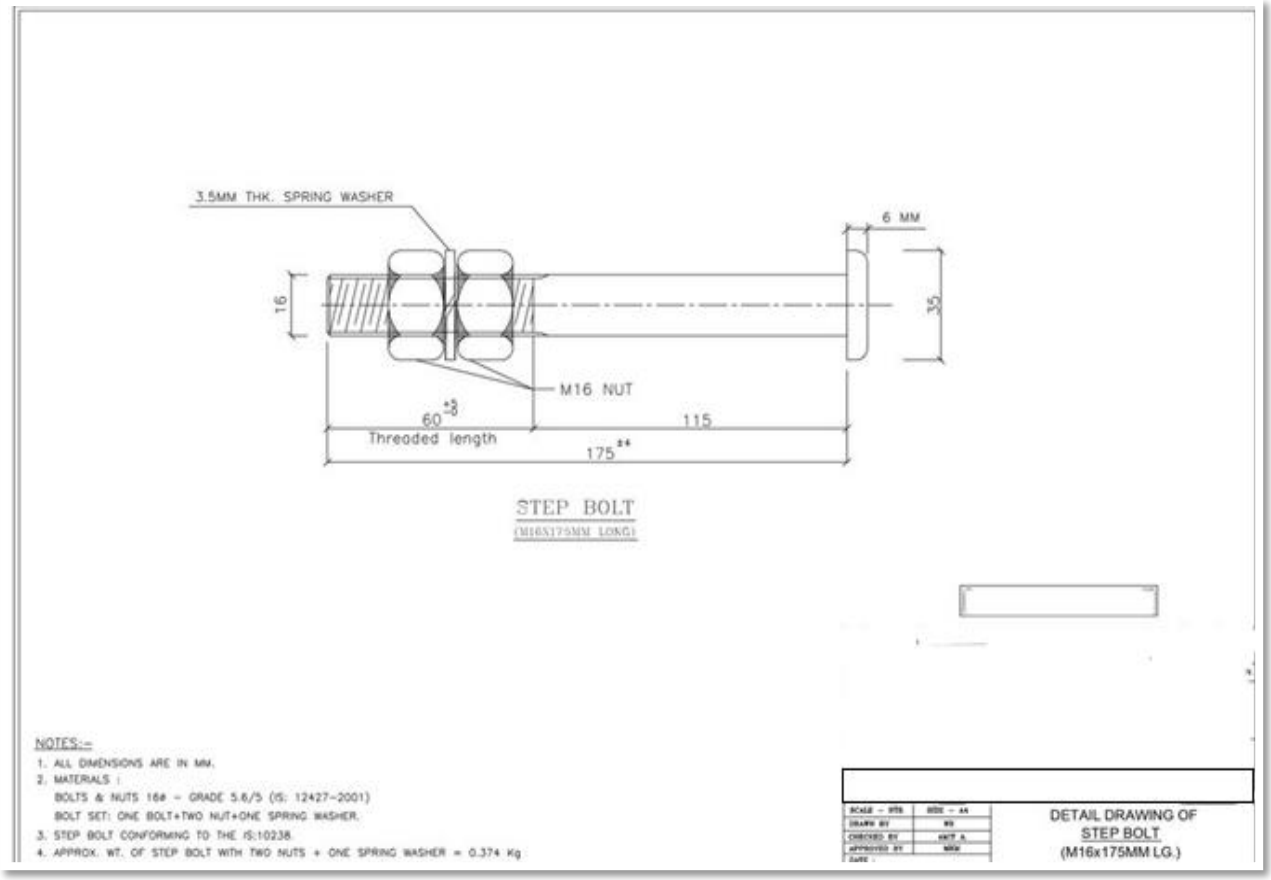
These drawings are conceptual and indicative and meant to give a general idea to the Bidder / Vendor. No information / data shown / not shown in these drawings shall be construed to relieve the Vendor of his responsibility to carry out the work as per this specification and / or construction drawings released during detail engineering. The specifications / details / dimension / arrangement mentioned are minimum requirement. Further details will be finalized during detail engineering as per project requirement, prudent industrial practices, owner's requirements and tender specifications etc without any cost implication to the owner.

Sl. No.	Description
1	CONCEPTUAL AND INDICATIVE SINGLE LINE DIAGRAM FOR TRANSMISSION LINE SYSTEM
2	CONCEPTUAL AND INDICATIVE SINGLE LINE DIAGRAM FOR OPGW SYSTEM
3	INDICATIVE TRANSMISSION LINE CORRIDOR FROM GIPCL RE PARK TO CTUIL KPS-II
4	ROAD SECTION AND DETAILS
5	DRAIN CULVERT LOCATION CO-ORDINATES
6	ANTI CLIMBING DEVICE
7	EARTHING – COUNTER-POISE
8	EARTHING – PIPE TYPE
9	STEP BOLT


BARBED WIRE (TYP.)
℄ OF TOWER
A.C.D. PLAN VIEW
SECTION B-B
(BARBED WIRE WRAPPING METHOD)
SECTION C-C
'A'
ELEVATION FOR A.C.D.
TOWER LEG
BARBED WIRE
12 WIDE X 12 DEEP SLOTS TO TAKE BARBED WIRE (TYP.)
ELEVATION VIEW
DETAIL 'A' (GATE DETAILS)
FOR TENDER PURPOSE ONLY
MARK NOS. ACD1 TO ACD6
DETAIL DRAWING OF
"ANTI CLIMBING DEVICE" (BARBED WIRE TYPE)
NOTES:-
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
HIGH TENSILE STEEL GRADE E-350 OF IS:2062:2011
MILD STEEL GRADE E-250 OF IS:2062:2011
ALL 16ø BOLTS & NUTS CONFORM TO IS:12427-2001 (GRADE 5.6/5)
BOLT SET: ONE BOLT+ONE NUT+ONE SPRING WASHER.
3. ALL STEEL MEMBERS SHALL BE HOT DIP GALVANIZED.
4. BLANK HOLES ARE PROVIDED AT GATE TO RECEIVE BARBED WIRE.
5. ✚ INDICATES HOLES OF 17.5mm DIA FOR 16mm DIA BOLTS.
6. THE BARBED WIRE SHALL CONFORM TO A-1, IS:278.
7. THE BARBED WIRE SHALL BE GIVEN CHROMATING DIP AS PER PROCEDURE LAID DOWN IN IS:1340.
8. THE DETAILS OF ACD ARE AS PER IS:5613(PART 3/SEC.1)-1989.


TOWER LEGS
7/3.0 GALVANISED STEEL
CONDUCTOR
OR AS AVAILABLE
TARMINALS 6MM THICK
JOINT SOLDERED
OR COMPRESSED
38.0
17.5
7/3.0 GALVANISED STRANDED
STEEL CONDUCTOR
OR AS AVAILABLE
COUNTERPOISE TYPE EARTHING
FOR TENDER PURPOSE ONLY
NOTES:-
1. ALL DIMENSIONS ARE IN MM.
2. THE DETAILS OF COUNTERPOISE TYPE EARTHING ARE AS PER IS:5613(PART 3/SEC.2)-1989.
DETAIL DRAWING OF
COUNTERPOISE TYPE EARTHING


STUB
50
2 BOLTS ø16mm
GROUND
LEVEL
450
45X6THK X 5M LONG
FLAT
PIPE FLATTENED
90
150
25ø GALV. IRON PIPE 3M LONG
3000 DEEP
6mm DIA OPEN HOLE
@ 150mm APPROX.
75
PIPE FLATTENED
150
300
NOTES :-
1. ALL DIMENSIONS ARE IN MM.
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED.
3. IN CASE OF DIFFICULT LOCATION, HORIZONTAL OR SLANT LAYING OF PIPE & LAYING WITHIN THE TOWER BASE OR FOUNDATION PIT SHALL BE PERMISSIBLE.
4. THE DETAILS OF PIPE TYPE EARTHING ARE AS PER IS:5613(PART 3/SEC.2)-1989.
BILL OF MATERIALS/SET OF EARTHING
Sl No. | Qty (Nos) | Section | Length (mm) | U/wt (kg) | Wt/Pc (kg) | Total Wt (kg)
1 | 1 | 25NB C.I. PIPE | 3000 | 02.41 | 07.23 | 07.23
2 | 1 | FL45X6 | 5000 | 02.12 | 10.60 | 10.60
SUBTOTAL = 17.83
Total List of Bolts&Nuts
3 | 2 | 16 Dia HRH Bolt&Nut | 40.0 | 0.1260 | 00.26
4 | 2 | 16 Dia HRH Bolt&Nut | TO Suit STUB | — | —
5 | 4 | Spring Washer for M16 Bolt | 03.5 | 0.0090 | 00.04
SUBTOTAL = 00.30
Grand Total = 18.13
TENDER PURPOSE ONLY
REV. | DATE | DESCRIPTION | DRAWN | CHECKED | APPRD.
PROJECT
CLIENT
DETAIL DRAWING OF
PIPE TYPE EARTHING


3.5MM THK. SPRING WASHER
6 MM
16
35
M16 NUT
60
Threaded length
115
175
STEP BOLT
NOTES:-
1. ALL DIMENSIONS ARE IN MM.
2. MATERIALS :
BOLTS & NUTS 16ø - GRADE 5.6/5 (IS: 12427-2001)
BOLT SET: ONE BOLT+TWO NUT+ONE SPRING WASHER.
3. STEP BOLT CONFORMING TO THE IS:10238.
4. APPROX. WT. OF STEP BOLT WITH TWO NUTS + ONE SPRING WASHER = 0.374 Kg
DETAIL DRAWING OF
STEP BOLT
(M16x175MM LG.)

ANNEXURE–G: TRANSMISSION LINE TOWER DATA

For Double Circuit Tower

Type of Tower	Deviation Limit	Typical Use
DA	0 – 2 deg.	1. To be used as tangent tower
DB	2 – 15 deg.	1. Angle towers with tension insulator string. 2. Also to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions. 3. Also to be used for Anti Cascading Condition (for usage as a section tower)
DC	15 – 30 deg.	1. Angle towers with tension insulator string. 2. Also to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions. 3. Also to be used for Anti Cascading Condition (for usage as a section tower)
DD	30 – 60 deg.	1. Angle towers with tension insulator string. 2. Also to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions.

For Multi Circuit Tower

Type of Tower	Deviation Limit	Typical Use
MA	0 – 2 deg.	1. To be used as tangent tower
MB	2 – 15 deg.	1. Angle towers with tension insulator string. 2. Also, to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions. 3. Also to be used for Anti Cascading Condition (for usage as a section tower)
MC	15 – 30 deg.	1. Angle towers with tension insulator string. 2. Also to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions. 3. Also to be used for Anti Cascading Condition (for usage as a section tower) 4. Tower type "MC" shall be used for transposition with 0 deg deviation with modification of cross arms.
MD	30 – 60 deg.	1. Angle towers with tension insulator string. 2. Also to be used for uplift force resulting from an uplift span up to 1000m under broken wire conditions.

Note: The no. of consecutive spans between the section points shall not exceed 15 spans or 5kms in plain terrain & 10 spans or 3kms in hilly terrain. A section point shall comprise of tension point with DB/MB type or DC/MC type or DD/MD type tower as applicable.

ANNEXURE-H: DESIGN PARAMETERS OF TRANSMISSION LINE

Parameter	Value
Nominal Voltage (kV)	400
Higher System voltage (kV)	420
Lightening impulse withstand voltage (1.2/50 micro sec) (kV peak)	1550
Power frequency withstand voltage under dry condition (kV rms)	680
Switching surge withstand voltage under wet condition (kV peak)	1050
Minimum corona extension voltage under dry condition (kV rms phase to earth	320
Maximum radio interference voltage under dry condition (micro volts)	1000 (at 320kV rms)