

## **SECTION – I**

### **GENERAL TECHNICAL CONDITIONS** **(GTC)**

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## **SECTION-I**

### **GENERAL TECHNICAL CONDITIONS**

#### **1.00 GENERAL:**

This part covers technical conditions pursuant to the contract and will form an integral part of the contract. The following provisions shall supplement all the detailed technical specifications and requirements brought out in accompanying Technical Specifications. The Contractor's proposal shall be based upon the use of equipment and materials complying fully with the requirements specified herein. It is recognized that the contractor may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Proposals offering similar equipment based on the manufacturer's standard practice will be considered provided such equipments meet other authoritative standards and will be of an equal or higher quality than the standard specified. Such equipment will also to meet the performance requirements specified and be acceptable to the Owner.

##### **a. Limit Of Contract:**

Equipment Furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for erection, completion and safe operation of the equipment as required by applicable codes, even though they may not have been specifically detailed in the technical specifications, unless included in the list of exclusions. All similar standard components/parts of similar standard equipments provided, shall be inter-changeable with one another.

Similarly, all services as may be necessary for the execution of the Contract though they may not have been specifically detailed in the Technical Specifications, unless specifically excluded, shall be furnished by the Contractor.

**b. Equipment Performance Guarantee:**

The performance guarantee of the equipment under the scope of the contract has been detailed in the Technical Specifications. These guarantees shall supplement the general performance guarantee provisions covered under General Conditions of Contract.

Penalty for not meeting performance guarantees during the performance and guarantee tests shall be assessed and recovered from the Contractor as detailed in Special conditions of Contract. Such penalties shall be in addition to damages, if any, payable under any other clause of Conditions of Contract, Special Conditions of Contract.

**c. Engineering Data:**

The furnishing of engineering data by the Contractor shall be in accordance with the schedule for each set of equipment and materials as specified in the Technical Specifications. The review of the data by the Engineer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment and materials provided under the Specifications, external connections and of the dimensions which might affect plant layout. This review by the Engineer may not indicate a thorough review of all dimensions, quantities and details of the equipment and materials, any device or item indicated or the accuracy of the information submitted. This review and/or approval by the Engineer shall not be considered, by the Contractor, as limiting any of its responsibilities and liabilities for

mistakes and deviations from the requirements, specified under these Specifications and Documents.

All engineering data submitted by the Contractor after final process including review and approval by the Engineer shall form part of the Contract Documents and all the works performed shall be in strict conformity with these specifications unless otherwise expressed in writing by the Engineer.

**d. Drawings:**

All drawings submitted by the Contractor including those submitted at the time of Bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break down for packing and shipment, the external connections, fixing arrangements required, the dimensions required for installation and inter-connections with other equipment and materials, clearances and spaces required for installation and inter-connections between various portions of equipment and any other information specifically requested in the Specifications.

Each drawing submitted by the Contractor shall be clearly marked with the name of the Owner, the unit/scheme designation, the specifications title, the specification number and the name of the project/scheme. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions shall be in metric units.

The drawings submitted by the Contractor shall be reviewed by the Engineer within four (4) weeks and shall be modified by the Contractor if any modifications and/or corrections are required by the Engineer. The Contractor shall incorporate such

modifications and/or corrections and submit the final drawings for approval. Any delay arising out of failure by the Contractor to rectify the drawings in time shall not alter the contract schedule.

The drawings sent for approval to the Engineer shall be in quadruplicate. One print of such drawings will be returned to the Contractor, by the Engineer marked 'Approved/ Approved with corrections' or resubmit with corrections as noted. The Contractor shall thereupon furnish to the Owner such number of prints of approved drawings as may be mutually agreed upon between the Owner and the Contractor and one reproducible original of the drawings, after incorporating all corrections. The Contractor shall supply soft copy of all such drawings in compact disc for easy reproduction later.

**e. Inspection, Testing And Inspection Certificate:**

The Engineer, his duly authorized representative and/or an outside inspection agency acting on behalf of the Owner shall have, at all reasonable times, access to the Contractor's or its Sub-vendor's/Sub-Contractors' premises or works and shall have the power, at all reasonable times to inspect and examine the equipment materials and workmanship of the works during its manufacture or prior to despatch and if part of equipment and materials is being manufactured or assembled at other premises or works, the Contractor shall obtain for the Engineer and for his duly authorised representative, permission to inspect as if the equipment and materials were being manufactured or assembled on the Contractor's own premises or works.

**f. Packaging And Transportation:**

All the equipment and materials shall be suitably protected coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Sites till the

time of erection, the contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

While packing all the equipment and materials, the limitations from the point of view of availability of Railway wagon sizes in India should be taken account of.

The Contractor shall also give due consideration to the encumbrances, infringements etc., likely to be encountered during the transportation of the equipment to the site and shall, at his own cost, make all arrangements as may be necessary to ensure smooth and safe movement of the goods to the site.

The Contractor shall at its own cost carry out investigation to select the route and the mode to be adopted for transportation of the goods.

**g. Protection:**

All coated surfaces shall be protected against corrosion, erosion, abrasion, impact, discoloration and any other damage. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. The parts that are likely to suffer damage by elements of nature especially those transshipped across the seas, shall also be properly treated and protected in a suitable manner.

**2 SCOPE:**

1. The bidders are requested to refer the sketch showing the orientation of the lines enclosed along with this specification.
2. The general scope of the work involved is the total/partial turnkey construction of 66/110KV MC/DC/SC lines which includes

design, fabrication and supply of tower parts and other materials, erection, testing and satisfactory commissioning of the lines as per Technical Specifications.

**The bidders are requested to refer the sketch showing the orientation of the lines enclosed separately.**

3. Conducting the Check survey of the 66/110KV SC/DC/MC lines as per the route profiles and tower schedule furnished to the contractor and correctly assess the type of towers, type of soils, type of foundation proposed for each location and also exact quantities of the other line materials.
4. Releasing of conductor, ground wire, insulator strings and other line materials and dismantling the towers of the existing 66/110KV DC/SC/MC lines and handing over the released materials to the KPTCL stores if applicable.
5. Preparation of route profile, Sag-Template curves, tower spotting charts, tower schedules, initial and final stringing chart and obtain the approval thereof.
6. The scope also includes supply of all tower accessories such as bolts, nuts, flat and spring washers, caution boards, number plates, phase plates, circuit plates, anti-climbing devices, tower earthing flats and earth electrodes, counterpoise earthing and earth bonds as stipulated in the aforesaid technical specifications.
7. Manufacture, testing and supply of 90KN and 120KN Disc Insulators OR Silicon Rubber Composite Insulators as per detailed technical specifications attached hereto.
8. Manufacture, testing and supply of ACSR Drake/AAAC Moose/ACSR Lynx/ACSR Panther/ACSR Coyote Conductor



accessories such as preformed Armour rods, mid span compression joints, vibration dampers, sub-conductor spacers, repair sleeves etc., as per detailed technical specifications attached hereto.

9. Manufacture, testing and supply of ACSR Drake/AAAC Moose/ACSR Lynx/ACSR Panther/ACSR Coyote Conductor and OPGW/7/3.15 mm earth wire as per Technical specifications.
10. Manufacture, testing and supply of ground wire/OPGW accessories and hardware such as mid span compression joints, repair sleeves, suspension fittings, tension fittings, vibration dampers etc., as per detailed technical specifications attached hereto.
11. Manufacture, testing and supply of insulators hardware such as line end suspension clamp assembly (I-string) along with tower end suspension fittings, line and tension clamp assembly along with tower end anchor fittings, as per detailed technical specification attached hereto.
12. Check survey, Erection of tower which includes soil testing excavation for foundations, stub assembly, stub setting and concreting, back filling and curing of foundations, sorting of tower parts, assembly & erection of towers, tack welding of tower bolts and nuts, payout of conductors, loose dead assembly of conductors, tensioning of conductors, clipping, fixing of tower accessories etc., as per detailed technical specification attached hereto including line testing, commissioning and handing over.
13. The scope of the work also includes releasing of conductor and ground wire, insulator strings and other line materials and dismantling of towers of the existing lines (If applicable).

14. The details of the lines with point of connection and termination, the approximate length of the lines, the voltage class of the lines is indicated in the Technical Specifications.

**The detailed scope of the work involved is as follows:**

a) **Survey:**

The bidder is advised to carry out a walk over survey/route inspection to familiarize with the work before quoting.

Preliminary and detailed survey, which includes route profiles, tower spotting and tower schedules have been got conduct by KPTCL. The contractor is required to conduct only a check survey for which KPTCL will provide the contractor with the necessary data such as topo sheet extracts, route profiles, tower schedules etc. However, in case the contractor finds upon site verification that the alignment of the line as per the survey conducted by KPTCL is not feasible for execution then the contractor will again conduct detailed surveys as per the technical specifications Section-II, Vol-IIB titled “Detailed Technical Specifications for conducting surveys, tower spotting etc” attached here to.

2.03.02 **Towers:**

The contractor shall supply the towers and extension pieces as per Detailed Technical Specifications for transmission line tower – Section-III (Volume-IIB).

2.03.03 **Overhead Line Power Conductors:**

The power conductors shall be got manufactured tested and supplied as per the detailed technical specifications Section-IV (Volume-IIB) titled “Detailed Technical Specifications for

manufacture, testing and supply of ACSR power conductors” attached here to.

**2.03.04 OPGW/Ground Wires:**

The static OPGW/ground wire or earth wire conductor shall be got manufactured and supplied as per the detailed technical specification Section-V (Volume-IIB) titled “Detailed Technical Specification for Ground wires/ detailed specification for OPGW” attached here to.

**2.03.05 Power Line Conductor Insulators:**

The insulators shall be got manufactured and supplied as per the detailed technical specification Section-VI (Volume-IIB) titled “Detailed Technical specifications for insulators” attached here to.

**2.03.06 Power Line Conductor Accessories:**

The power conductor accessories shall be got manufactured and supplied as per the detailed technical specifications Section-VII (Volume-IIB) titled “Detailed technical specification for Power line conductor accessories” attached here to.

**2.03.07 Ground Wire/OPGW Accessories:**

The ground wire accessories shall be got manufactured and supplied as per the detailed technical specification Section-VIII (Volume-IIB) titled “Detailed Technical Specification for ground wire accessories” attached here to. For OPGW accessories the contractor shall refer the specification uploaded separately.

**2.03.08 Insulator Hardware:**

The power line conductor insulator hardware shall be got manufactured and supplied as per the detailed technical

specification Section-IX (Volume-IIB) titled “Detailed Technical Specification for insulator hardware” attached here to.

**2.03.09 Line erection, insulation, testing and commissioning:**

The line erection which includes soil investigation, soil testing for tower foundations, stub assembly, stub setting, concreting of foundations, back filling and curing, assembly of tower superstructure, pave out of conductors, hoisting of insulators, stringing and tensioning of power and ground wire conductors, fixing of conductor accessories, fixing of tower accessories etc testing and commissioning of the lines and handing over of lines shall be as per the detailed technical specification Section-X(A) titled “Stub setting and casting of foundations” and Section-X(B) titled “Erection, installation, testing and commissioning of lines” attached here to.

**Guaranteed Technical Particulars (GTP):**

The bidder shall furnish the GTPs of towers and all the line materials in the Data Requirement Sheets as per Section -XI

**3.00 APPLICABLE STANDARDS:**

The applicable standards are specified in each of the detailed technical specifications Section-I to X attached here to.

**4.00 SERVICE CONDITIONS:**

The lines covered under this contract has to run in agricultural land and scattered residential areas of Respective Taluks and shall be suitable for the hot and humid tropical climatic conditions prevailing in the State. These are furnished here below:

- i. Peak ambient day temperature in still air – 40°C.

Minimum night temperature – 10°C.

ii. Average maximum ambient day temperatures.

June to January – 35°C.

February to June – 45°C.

iii. Relative humidity: maximum – 90 %  
minimum – 10 %

iv. Average rainfall – As per the recent published Meteorological data.

v. Average number of rainy days:- 150 between April and November.

vi. Average number of thunderstorm days – 30 between April and November.

vii. Altitude:

Varying from 0 to 250 m in the coastal areas

Varying from 250 to 1000 m in the plains

500 m in the Western Ghats

viii. Maximum wind speed

39 m/sec in the coastal areas, the Western Ghats and the plains of northeastern Karnataka.

33 m/sec in the plains of northwestern and southern Karnataka.

## 5.00 **BASIC TECHNICAL PARAMETERS OF THE LINES:**

5.01 (If applicable only)

<b>A. Electrical System Data:</b>			
i. System Voltage (kV rms)	220KV	110KV	66KV
ii. Maximum Voltage (kV rms)	245	123	72.5
iii. Lightning impulse withstand voltage (dry & wet) (kVp)	1050	550	325
iv. Power frequency withstand voltage (wet) (kVp)	460	230	140

v. Power frequency withstand voltage (dry) (kVp)	510	265	165	
vi. Short circuit level (KA)/duration	40/1 Sec	25/1 Sec	25/1 Sec	
<b>B. Line Data:</b>				
i) <b>Conductor:</b>				
i. Name	<b>DRAKE</b>	<b>LYNX</b>	<b>COYOTE</b>	
ii. Strands and wire diameter of				
i. Aluminium	26/4.442	30/2.79	26/2.55	
ii. Steel	7/3.45	7/2.79	7/1.90	
iii. Overall diameter (mm)	28.13	19.53	15.86	
iv. Weight (kg/km)	1623.5	844	521	
v. Conductor per phase	Single	Single	Single	
vi. Spacing between the conductors of same phase (Vertical) mm	4900	3100	2100	
vii. Configuration				
a) Single Circuit	Delta	Right angled Triangle	Right angled triangle	
b) Double Circuit	Vertical	Vertical	Vertical	
viii. Minimum ultimate tensile strength (kg)	14175	7950	4625	
ix. Conductor tension at 32°C without external load				
a) Initial unloaded tension	35%	35%	35%	
b) Final unloaded tension	25%	25%	25%	
<b>C. Galvanized Steel Earth wire (Ground Wire)/OPGW:</b>				
i. Size (strands and wire diameter) (mm)	7/3.15( 320M span)	OPGW( 280M span)	7/3.15	7/3.15
ii. Overall diameter (mm)	9.45	11.9	9.45	9.45
iii. Standard weight (Kg/km)	428	451	432	432
iv. Location of earth wire/OPGW	One continuous earth wire to run horizontally on the top of the towers and conductors			
v. System of Grounding	Solidly earthed	Solidly earthed	Solidly earthed	
vi. Progressive shielding angle	30°	30°	30°	

vii. Isokeraunic level	50		50	50
viii. Tensile load in each Earthwire/OPGW				
At minimum temperature of 10°C and in still air (kgs)	1219	1005	1303	1286
At everyday temperature of 32°C and still air (kgs)	1090	889	1161	1129
At 10°C and 2/3 <sup>rd</sup> full wind (kgs)	1323	2252	1404	1371
<b>D. Towers:</b>				
i. Span length in Mtrs: Ruling design span	320		320	275
ii. Wind span in meters	320		320	275
iii. Wind Load (Kg/sq.m)	104		103.5	84
iv. Weight span in meters				
Minimum weight span	-640		-640	-550
Maximum weight span	640		640	550
<b>E. Insulators:</b>				
i. Type of Insulators	Porcelain Disc/Silicon rubber composite insulator			
ii. Lightning protection to insulator	Arcing horns both on the conductor side and cross arm side			

<b>A. Line Data:</b>	
<b>i) Conductor:</b>	
i. Name	<b>Panther ACSR</b>
ii. Strands and wire diameter of <div>           i. Aluminium            ii. Steel         </div>	30/3.0 7/3.0
iii. Overall diameter (mm)	21.00
iv. Weight (kg/km)	974
v. Conductor per phase	Single
vi. Min. Spacing between the conductors of same phase (Vertical) mm	3900
vii. Configuration <div>           c) Single Circuit             d) Double Circuit         </div>	Right angled Triangle  Vertical
viii. Minimum ultimate tensile strength (KN)	89.67
ix. Conductor tension at 32°C without external load <div>           c) Initial unloaded tension            d) Final unloaded tension         </div>	35% 25%
ix. Tensile load in each Earthwire/OPGW <div>           At minimum temperature of 10°C and in still air (kgs)            At everyday temperature of 32°C and still air (kgs)            At 10°C and 2/3<sup>rd</sup> full wind (kgs)         </div>	1303 1161 1404



The Weight span for 220KV, 66KV & 110KV DC towers considered in the design which is being supplied to the successful contractor is as follows:

i. 220KV D/C Towers of design code: KPTCL-2D-GDG

<b>Tower Type</b>	<b>Normal Condition Max</b>	<b>Normal Condition Min</b>	<b>BWC Max</b>	<b>BWC Min</b>
‘DA’	640	160	384	80
‘DB’, ‘DC’, ‘DD’	640	-640	384	-384

ii. 110KV D/C of Towers design code: KPTCL-1D-AQS:

<b>Tower Type</b>	<b>Normal Condition Max</b>	<b>Normal Condition Min</b>	<b>BWC Max</b>	<b>BWC Min</b>
‘DA’	640	160	384	80
‘DB’, ‘DC’, ‘DD’	640	-640	384	-384

iii. 66KV D/C Towers of design code: KPTCL-6D-NGML

<b>Tower Type</b>	<b>Normal Condition Max</b>	<b>Normal Condition Min</b>	<b>BWC Max</b>	<b>BWC Min</b>
‘DA’	550	140	330	70
‘DB’, ‘DC’, ‘DD’	550	-550	330	-330

These values shall be used for tower spotting during survey.

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