

# KARNATAKA SOLAR POWER DEVELOPMENT CORPORATION LIMITED

BID ENQUIRY NO. KSPDCL/SP/F-29/2015-16/02 DATED 09-12-2015

## BIDDING DOCUMENTS FOR

Establishing 4 nos of 2 x 150 MVA, 220/66kV stations at Nagalamadike Hobli in Pavagada Taluk, Tumkur District along with connected Transmission lines and Terminal Bays on Total Turnkey Basis, in two lots ( Lot1 & Lot 2 ) in respect of the proposed 2000 MW Pavagada Solar Park in Tumkur District, Karnataka including supply of all Materials, Erection (including Civil Works ), Testing and commissioning..

### BID DOCUMENTS CONSIST OF THE FOLLOWING VOLUMES

<u>VOLUME- I</u>		<u>COMMERCIAL REQUIREMENTS</u>	
1. Section – I	Invitation For Bids	-	IFB
2. Section – II	Instruction to Bidders	-	ITB
3. Section – III	General Terms and Conditions of the Contract	-	GCC
4. Section – IV	Erection Conditions of Contract	-	ECC
5. Section – V	Special Conditions of Contract	-	SCC
6. Section – VI	ANNEXURE	-	ANNEX

### VOLUME-II                      TECHNICAL REQUIREMENTS

VOLUME-IIA –	STATION PORTION
VOLUME -IIB –	LINE PORTION

### VOLUME- III                      BID PROPOSAL SHEETS

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2. Section – II      PRICE SHEETS

**THIS BID DOCUMENT CONTAINS FOLLOWING VOLUMES:**

**VOLUME-IIA : TECHNICAL SPECIFICATIONS (PART 1 OF 3)**

**OTHER VOLUMES CONTAIN THE FOLLOWING:**

**VOLUME-I                    GENERAL CONDITION OF CONTRACT  
                                      SPECIAL CONDITIONS OF CONTRACT**

**VOLUME-IIA                TECHNICAL SPECIFICATIONS  
(PART 2 OF 3)**

**VOLUME-IIA                TECHNICAL SPECIFICATIONS  
(PART 3 OF 3)**

**VOLUME -IIB –            TECHNICAL SPECIFICATIONS FOR LINE PORTION**

**VOLUME- III                    BID PROPOSAL SHEETS**

**Section – I    TECHNO COMMERCIAL SHEETS**

**Section – II   PRICE SHEETS**

**KARNATAKA SOLAR POWER DEVELOPMENT CORPORATION  
LIMITED**

BID ENQUIRY NO. KSPDCL/SP/F-29/2015-16/02 DATED 09-12-2015

**BIDDING DOCUMENTS FOR**

ESTABLISHING 4 NOS OF 2 X 150 MVA, 220/66KV STATIONS AT NAGALAMADIKE HOBLI IN PAVAGADA TALUK, TUMKUR DISTRICT ALONG WITH CONNECTED TRANSMISSION LINES AND TERMINAL BAYS ON TOTAL TURNKEY BASIS, IN TWO LOTS ( LOT1 & LOT 2 ) IN RESPECT OF THE PROPOSED 2000 MW PAVAGADA SOLAR PARK IN TUMKUR DISTRICT, KARNATAKA INCLUDING SUPPLY OF ALL MATERIALS, ERECTION (INCLUDING CIVIL WORKS ), TESTING AND COMMISSIONING.

**VOLUME-IIA**

**(PART 1 OF 3)**

**TECHNICAL SPECIFICATION**

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**ISSUED BY**

The Chief Executive Officer,  
KSPDCL,  
BANGALORE-560 001.

# VOLUME-IIA

## SECTION-I (GENERAL)

### 1.0 GENERAL:

#### 1.1.0 PREAMBLE:

1.1.1. Karnataka Solar Power Development Corporation Limited is responsible for evacuation of power from the Solar Park in Pavagada Taluk, Tumkur Dist. in the state of Karnataka and henceforth referred to as Owner.

1.1.2. The owner proposes to establish 8 numbers of 220KV/66KV sub-stations and connected 220kV transmission lines, under the programme. **The scope of the works includes, Establishing 4 nos of 2 x 150 MVA, 220/66kV stations at Nagalamadike Hobli in Pavagada Taluk, Tumkur District along with connected Transmission lines and Terminal Bays on Total Turnkey Basis, in two lots ( Lot1 & Lot 2 ) in respect of the proposed 2000 MW Pavagada Solar Park in Tumkur District, Karnataka including supply of all Materials, Erection (including Civil Works ), Testing and commissioning.**

1.2.0 The scope of works in this bid document (Specifications) covers scope as in clause 2.0 for executing the above mentioned works on Total Turnkey basis.

Before proceeding with the construction work of the new sub-station and extension works at existing sub-station, the bidder shall fully familiarize himself with the site conditions and General arrangements & schemes etc. Though the owner shall endeavor to provide the information, it shall not be binding for the Owner to provide the same.

The bidders are advised to visit the sub-station sites and acquaint themselves with the topography, infrastructure and design philosophy. The bidders shall be fully responsible for providing all equipments, materials, system, and services specified or otherwise which are required to complete the construction and successful commissioning of the sub-station in all respects in this turn key package. Non-visiting of sub-station site will not be acceptable as an excuse for claiming changes/ variations.

### 2.0 SCOPE:

2.1 The detailed scope shall be as follows:

#### **LOT 1:**

- a) Establishing 2x150MVA, 220/66kV sub station at Tirumani Sy no. 154/2,3,4 & 5
- b) Establishing 2x150MVA, 220/66kV sub station at Tirumani Sy no. 131/1 & 2
- c) Establishing 2x150MVA, 220/66kV sub station at Rayacharlu Sy no. 225/1,2 & 3
- d) Establishing 2x150MVA, 220/66kV sub station at Rayacharlu Sy no. 175
- e) Construction of about 12 kms of 220kV SC line, 4 kms of 220kV DC line & 11 kms of Multi Circuit Line to PGCIL 400/220kV station.

#### **LOT 2:**

- a) Establishing 2x150MVA, 220/66kV sub station at Kyataganacharlu Sy no. 44
- b) Establishing 2x150MVA, 220/66kV sub station at Vallur Sy no. 242
- c) Establishing 2x150MVA, 220/66kV sub station at Vallure Sy no. 166
- d) Establishing 2x150MVA, 220/66kV sub station at Ballasamudra Sy no.35/2
- e) Construction of 6 kms of single circuit, 2 kms of double circuit and 3 kms of multi circuit 220kV line to PGCIL 400/220kV station..

**On Total Turnkey basis** including Supply of all matching Materials/Equipment's and Erection (including Civil Works) of all Materials / Equipment's, Testing and Commissioning.

a. The layout Plan and connected drawing and schedule of quantities are furnished as below:

**Please refer the drawings uploaded**

b. The salient features of the site plan and detailed layout plan are as follows:

i.

**Please refer the drawings uploaded**

ii. Lines:

220KV SC, DC and Multi Circuit lines proposed to be connected to the terminal bays of the proposed PGCIL station at Solar Park.

iii. Power Transformers:

a. **2X150MVA.**

iv. Control Room:

v. Levels:

**Yard level shall be maintained as per the directions of the Engineer in charge**

vi. Cable ducts:

**Only routes of cable ducts, A, B, C & D type are indicated in the layout drawing. For details of type of cable ducts, refer drawings furnished.**

## **2.1.1 Supply of equipments/materials:**

2.1.1.1 Design, Engineering, Manufacture, Testing at Manufacturer's works and supply of following equipments.

i) Power transformers with NIFPS.

ii) SF6 type circuit breaker      220kV, 66kV

iii) Isolators                              220kV, 66kV

iv) Current Transformer              220kV, 66kV

v) Voltage Transformer              220kV, 66kV

vi) Lightning arrestor              198KV, 96kV & 30kV class

vii) PLCC equipments              220KV class (Optional)

viii) Control & Relay panels      220kV, 66kV & 11kV class

- ix) LTAC panels
- x) Battery & Battery charger  
(of 230 Volts & 48 volts DC)
- xi) Control & power cables
- xii) Bay marshalling kiosk & Outdoor AC distribution box
- xiii) SAS Panel.
- xiv) 11/0.433 KV distribution transformer
- xv) DG set
- xvi) Illumination fittings for both outdoor & Indoor
- xviii) Office furniture
- xix) Fire Fighting Equipments
- xx) Switchyard materials-cylindrical solid core post insulator/Disc Insulator Drake ACSR, Aluminium pipe & accessories, Insulator Hardware clamps & Power connectors etc.
- xxi) Earthing Materials etc.,

2.1.1.2 i) Fabrication and supply of lattice type station structures viz Towers, beams & Lighting cum Lightning masts, as per the single line diagrams furnished by owner.

ii) Design, fabrication and supply of equipment/post insulator support structures ( lattice type)

2.1.1.3 Any other equipment / material required for successful completion of the projects

## **2.1.2 Civil Works:**

2.1.2.1. Leveling of the sub-station area in accordance with the levels furnished by owner and consolidation.

2.1.2.2. Design, Engineering, and execution of following works

- i) Protection works for the filled up soil i.e., retaining wall/pitching.
- ii) Control Room building
- iii) Foundation for power transformers, Circuit Breakers, & 11KV Switchgear.
- iv) Foundation for station structures, equipment / post insulator support structures
- v) Foundation for Bay marshalling kiosk/ACDB.
- vi) Cable ducts
- vii) Approach Road (outside sub-station area) and inside sub-station area
- viii) Drainage system for sub-station area.
- ix) Water supply system for drinking & other purposes.
- x) Sewerage system for control building.
- xi) Anti Weed Treatment, Final dressing of land & Gravel filling.
- xii) Transformer oil drainage sump.

2.1.2.3 Any other work required for successful completion of the project.

## **2.1.3 Laying of Earthmat:**

Laying of earth mat & Earthing of Equipments.

#### **2.1.4. Erection:**

- 2.1.4.1. Erection of station structures, Equipment Mounting Structures, equipments like Transformers, Circuit breaker etc., post insulators, Yard illumination Structures, Control Room Equipments like C & R Panels, Battery & Charger, etc., inside the control room, Fire Fighting Equipments, etc.
- 2.1.4.2. Installation of main bus & cross bus including equipment interconnections
- 2.1.4.3. Laying of control & power cables and Termination.
- 2.1.4.4. Providing Nitrogen Fire Extinguishing System for 150MVA Transformers.
- 2.1.4.5. Installation of illumination fittings for both outdoor & Indoor.
- 2.1.4.6. Erection of any other equipment / material required for successful completion of the project.

#### **2.1.5 Testing & commissioning of the Sub-station and Terminal Bays:**

Testing & Commissioning of the complete sub-station .

- 2.1.6 All materials required for the Civil construction / installation work shall be supplied by the contractor. The cement and steel shall also be supplied by the contractor.
- 2.1.7 The contractor shall also be responsible for the overall co-ordination with internal/external agencies, project management, training of owner's manpower, loading, unloading, handling, moving it to final destination for successful erection, testing and commissioning of the substation.

#### **2.2 Typical drawings / documents:**

- 2.2.1 The typical drawings furnished are for the guidance of the bidder. Successful bidder shall verify the drawings and furnish modified design if any. Drawings shall be submitted for approval of owner, whether with or without modified designs. Only after the approval of owner, the drawings shall be released for construction/installation.

Available typical drawings may be collected from the office of the Chief Executive Officer, Bengaluru.

#### **2.2.2 Specific exclusions:**

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

- a) Colony area.
- b) Boundary wall along substation property line.
- c) Owner's site office and stores.

- 2.2.3. Any other items not specifically mentioned in the specification but which are required for erection, testing and commissioning and satisfactory operation of the sub-station are deemed to be included in the scope of the specification unless specifically excluded.

#### 2.2.4. Schedule of Quantities:

- i) The detailed description of various items/equipments and civil works are indicated at **Annexure-I**. The bill of quantity of major equipment's are also indicated and wherever the quantities are not indicated, the bidder is required to compute the ceiling quantity. In all such cases payment will be made for the ceiling quantity vis-a-vis the exact quantity (arrived at after detailed engineering) whichever is lowest. Bidder is required to indicate unit rate and total price of the items under respective heads in bid proposal sheet. Bidders should include all such items in the bid proposal sheets, which are not specifically mentioned but are essential for the execution of the contract.
- ii) The quantities indicated are estimated, based on the switchyard layout. In case of towers, beams and lightning masts the bidder has to quote on the basis of single line diagram. The bidder has to quote on number wise, irrespective of whatever may be the weight of tower, beam or lightning mast.

In respect of Civil works, the quantities are mentioned in numbers/ metres/ Lumpsum/Kgs/M.Ton/Cmtr/Sqmr. The same are furnished based on layout drawings.

Actual quantities executed will be measured and paid at the accepted rates.

The rates for increase in quantity, non-tendered and extra items will be as per Commercial conditions.

#### 2.3 Layout arrangements:

Please refer the uploaded drawings for switching scheme adopted for [220/66kV Substation at Solar Park, Pavagada](#).

#### 2.4 Location of the substation:

The locations of Sub-Station is indicated below:

Sl. No.	Name of Sub-Station	Nearest Railway station	Railway zone
1	a. Establishing 2x150MVA, 220/66kV sub station at Tirumani Sy no. 154/2,3,4 & 5 b. Establishing 2x150MVA, 220/66kV sub station at Tirumani Sy no. 131/1 & 2 c. Establishing 2x150MVA, 220/66kV sub station at Rayacharlu Sy no. 225/1,2 & 3 d. Establishing 2x150MVA, 220/66kV sub station at Rayacharlu Sy no. 175	Penukonda	
2.	a. Establishing 2x150MVA, 220/66kV sub station at Kyataganacharlu Sy no. 44 b. Establishing 2x150MVA, 220/66kV sub station at Vallur Sy no. 242		



	<p>c. Establishing 2x150MVA, 220/66kV sub station at Vallure Sy no. 166</p> <p>d. Establishing 2x150MVA, 220/66kV sub station at Ballasamudra Sy no.35/2</p>		
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**2.5 Meteorological data:**

The metrological data of the substations is indicated at **Annexure-II**. However for design purposes, ambient temperature should be considered as 50°C.

**2.6 Soil Data:**

Soil investigation report if available may be obtained from the Chief Executive Officer, KSPDCL and if the same is not available the contractor has to carryout the Soil investigation. Successful bidder shall furnish designs for civil works which will be approved by owner. Any variations of foundations etc., due to change in type of soil & consequent changes in foundation design shall be to the account of successful bidder and KSPDCL will not be responsible for any extra cost.

**2.7 Reference Drawings:**

The reference (Typical) drawings, which form a part of the specifications, are given at **Annexure-III**. The bidder shall maintain the overall dimensions of the substation, bay length, bay width, phase to earth clearance, phase to phase clearance and sectional clearance, clearances between buses, bus heights but may alter the locations of equipments to obtain the statutory electrical clearances required for the substation. The drawings enclosed give the basic conceptual scheme, layout of substation, substation buildings, associated services etc. in case of any discrepancy between the drawings and text of specification, the requirements of text shall prevail in general. The successful bidder shall furnish all the drawings for approval of owner.

2.8 The prices of the PLCC equipments shall be given by the bidder in the relevant schedule of bid proposal sheets and shall be considered for evaluation of bid. It shall not be binding on the owner to procure these equipments.

**2.8.3 Mandatory spares & Maintenance tools & plants:**

The Mandatory spares & maintenance tools & plants shall be included in the bid proposal by the bidder. The prices of these spares shall be given by the bidder in the relevant schedule and will be considered for evaluation of bid.

**2.8.4 Optional Spares:**

The bidder shall identify and recommended the list of optional spare parts required together with their quantity to meet the specified performance for a period of three years. The item schedule and prices of these shall be given by the bidder in relevant schedule and shall not be considered for evaluation of the bid. The bidder must also indicate the basis for recommendation of optional spares. The Bidder shall also recommended their source of availability and technical particulars. The bidder may also suggest addition or deletion of spares items over this list. The list of spare parts shall be finalized between the Owner and the Contractor after the completion of detailed engineering.

**2.9 Specific Requirements:**

2.9.3 The bidder shall be responsible for safety of human and equipment during the working. It will be the responsibility of the Contractor to co-ordinate and arrange for obtaining necessary clearance before commissioning.

**2.10 Special tools and tackles:**

The bidder may include in his proposal the deployment of all such special tools and tackles required for erection, testing, commissioning and maintenance of equipment. However a list of all such devices should be indicated in the relevant schedule provided. In addition to this the contractor shall also furnish a list of special tools and tackles for the various equipment in a manner to be referred by the Owner during the operation of these equipment.

**2.11 Arrangements required to be made by the Contractor:**

2.11.1 Electricity

The contractor shall make his own arrangements for electrical power required for construction purposes as well as for its staff labour colony.

2.11.2 The contractor should make own arrangements for construction water supply. Bore wells/open wells can be dug at a suitable point in consultation with the owner.



#### **ANNEXURE-1A**

Statement showing the requirement of equipments/materials for Supply & Erection Portion:

**Please refer the uploaded Techno Commercial and Price sheets.**

#### **ANNEXURE- I B**

Statement showing the requirement of equipments/materials for Civil Works Portion:

**Please refer the uploaded Techno Commercial and Price sheets.**

#### **ANNEXURE - 1C**

Statement showing the requirement of MANDATORY SPARES:

**Please refer the uploaded Techno Commercial and Price sheets.**

## VOLUME – IIA

### ANNEXURE – II

#### **SECTION – I (GENERAL) METEOROLOGICAL DATA**

1.	Temperature	Minimum 0 <sup>0</sup> C Maximum 50 <sup>0</sup> C Everyday 32 <sup>0</sup> C
2.	Relative Humidity	Maximum : 100% Minimum : 10%
3.	No. of Rainy days per year	up to 120 days
4.	Average rainfall per year	1000mm to 6000mm
5.	Altitude	up to 1500Mtr.
6.	Wind Pressure	130Kg / Sq. Mtr.

**APPENDIX-1**

Sheet 1 of 1

**Details of Control Cables to be used for equipments**

Sl. No	Equipments	SIZE OF CONTROL CABLE FOR	
		220KV	110/66KV
1.	SF6 circuit breaker	a. 1x19 core 2.5 sqmm b. 1x10 core 2.5sqmm	a. 1x19 core 2.5sqmm --
2.	CVT (for PLCC)	Co-axial cable	--
3.	Current transformer	5x4 core 6sq.mm	--
4.	NCT (for transformer)	1x2 core 6 sqmm	1x2core sqmm
5.	Voltage transformer & CVT (for protection)	3x4 core 10sqmm	3x4 core 10 sqmm
6.	Isolation – 220 KV	1x10 core 2.5 sqmm	1x4 core 2.5 sqmm
7.	Transformer i. Power Transformer Marshalling box to a. Control & relay panel b. RTCC panel Between RTCC panels ii. AC power supply from LTAC panel to Tr. Radiator bank	7x19 core 2.5 sqmm  1x4 core 25 sqmm	4x19 core 2.5 sqmm  1x4 core 25 sqmm
8.	AC power supply from AC distribution box to a. Isolators b. Breakers	1x4 core x 4sqmm Al. 1x4 core x 4sqmm Al.	1x4 core x 4sqmm Al
9.	Interlocks	1x2 core 2.5 sqmm	1x2 core 2.5 sqmm
10	Yard lighting AC power supply from LTAC panel to lightning masts	1x4 core 95 sqmm aluminium	

NOTE:

1. Material of conductor=For Sl.No. 1 to 9 is copper
2. The size of control cable mentioned above for 110/66KV circuit breaker is for group operating mechanism. For individual operating mechanism 1x10 core, 2.5 sqmm cable has to be used in addition to 1x19 core.

**APPENDIX-2**

**REFER TECHNICAL SPECIFICATIONS OF CONTROL & RELAY  
PANELS**

**APPENDIX-3**

**Part 1 of 2**

**Technical Parameters of Current Transformers (Type & Rating)**

**Please refer the uploaded scanned copy of Technical  
parameters for Current transformers 'APPENDIX-3'**