

# **Bharat Heavy Electricals Ltd.,**

(A Government of India undertaking)

## **Electronics Division**

PB No.2606, Mysore Road, Bangalore-560026, India

Quotations are invited under two part bid system for Supply and I&C of Balance of System (BOS) package for 100MW GSECL-Raghanesda 2 Solar Power project through e-procurement route.

Kindly refer Website <https://eprocurebhel.co.in/nicgep/app/> for details.

|                                                                       |                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RFQ NO and date                                                       | TGPBOS0056 dated 04.03.2021. (E-tender)                                                                                                                                                                                                                                                                                          |
| RFQ due date & time                                                   | 10 <sup>th</sup> March 2021 up to 13.00 hrs (IST)                                                                                                                                                                                                                                                                                |
| Date, Time & Venue of Part-I Bid Opening                              | 10.03.2021 after 13.30 hrs (IST) (E-tender) – Website<br><a href="https://eprocurebhel.co.in/nicgep/app/">https://eprocurebhel.co.in/nicgep/app/</a>                                                                                                                                                                             |
| Date, Time & Venue of Price Bid opening                               | Will be intimated later for technically accepted vendors.                                                                                                                                                                                                                                                                        |
| Address for Communication & Contact Person in BHEL                    | Engineering Department:<br>Mr. Nanda Kishore (8197275295)<br>Purchase Department:<br>Mr. Pragadeesh TG (9742576787)<br>BHEL SBD,<br>Malleswaram, opp IISC<br>Bangalore-560 012. INDIA<br>Email: <a href="mailto:pragadeeshtg@bhel.in">pragadeeshtg@bhel.in</a><br><a href="mailto:nandakishore@bhel.in">nandakishore@bhel.in</a> |
| Name and address of the Independent External Monitor for this tender. | IEM :Sh. Arun Chandra Verma, IPS (Retd.) and Sh Virendra Bahadur Singh, IPS (Retd.)                                                                                                                                                                                                                                              |

Any Deviations from or additions to the "General Conditions of Contract" or "Special Conditions of Contract" require BHEL's express written consent. The General Terms of Business or Sale of the Bidder shall not apply to this tender.

# REQUEST FOR QUOTATION

|                                                                                  |                                                                                                                         |                                                                                                                                 |                                                              |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br>Electronics Division<br>PB No. 2606, Mysore Road Bangalore - 560026<br>INDIA | <b>RFQ NUMBER:</b><br>TGPBOS0056<br><br><b>RFQ DATE :</b><br>04.03.2021                                                         | Due Date/Day: 15.03.2021 MON<br>Time : 13:00 HRS<br>E-TENDER |
| MMI:PU:RF:003                                                                    |                                                                                                                         |                                                                                                                                 |                                                              |
| (address for communication) :                                                    |                                                                                                                         | (for all correspondence)<br>Purchase Executive : TG Pragadeesh<br>Phone : 080 26998377<br>Fax :<br>E-mail: pragadeeshtg@bhel.in |                                                              |

| SI No. | Description                                                                                                                                                                                                                                                                                                                                                                                        | Qty | Unit | Delivery qty | Delivery Date |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------------|---------------|
| 1      | PS0679082930 Supply of MC4 connectors, cable ties etc<br>* HSN/SAC : 8544<br>Test Certificate<br>Supply of MC4 connectors, cable ties, HDPE conduits, cable lugs, hardware etc.                                                                                                                                                                                                                    | 1   | ST   | 1            | 15.06.2021    |
| 2      | PS0679082948 Supply of LT control / instrumentation<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of LT, Control / Instrumentation cables with cable installation accessories, hardware, termination kits etc.                                                                                                                                                                                 | 1   | ST   | 1            | 15.06.2021    |
| 3      | PS0679082956 Supply of UPS panels, FCBC, ACDB, UPS DB<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of UPS, FCBC, ACDB, UPS DB, Batteries, Aux transformer, 33KV 1C to 3C cable conversion panels etc. with all related accessories and hardware                                                                                                                                               | 1   | ST   | 1            | 15.06.2021    |
| 4      | PS0679082964 Supply of earthing items<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of items of earthing system for solar array field, inverter platform/ control room panels, transformer yard equipment, HT panel platforms etc. including earthing electrodes & earthing chemicals, Copper flats, earthing cables, GI wires, earth chamber lids and all related miscellaneous hardware etc. | 1   | ST   | 1            | 15.06.2021    |
| 5      | PS0679082972 Supply of lightning arrestors<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of lightning arrestors along with poles/masts, down conductors, all related accessories and hardware for the complete solar power plant                                                                                                                                                               | 1   | ST   | 1            | 15.06.2021    |

|                                                                                   |                                                                                           |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| * The HSN/SAC no mentioned against the line items in the RFQ are indicative only. | For and On behalf of BHEL.<br><br><br>TG Pragadeesh<br>Semiconductors & Pho<br><br>1 OF 5 |
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# REQUEST FOR QUOTATION

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|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br>Electronics Division<br>PB No. 2606, Mysore Road Bangalore - 560026<br>INDIA | <b>RFQ NUMBER:</b><br><b>TGPBOS0056</b><br><br><b>RFQ DATE :</b><br>04.03.2021                                                  | Due Date/Day: 15.03.2021 MON<br>Time : 13:00 HRS<br>Tender Box : Reception Area<br>Opening Venue:<br>NEW ENGG. BLDG |
| MMI:PU:RF:003                                                                    |                                                                                                                         |                                                                                                                                 |                                                                                                                     |
| (address for communication) :                                                    |                                                                                                                         | (for all correspondence)<br>Purchase Executive : TG Pragadeesh<br>Phone : 080 26998377<br>Fax :<br>E-mail: pragadeeshtg@bhel.in |                                                                                                                     |

| SI No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qty | Unit | Delivery qty | Delivery Date |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------------|---------------|
| 6      | PS0679082980 Supply of items for plant lighting<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of items for plant lighting system such as lighting poles, bend pipes, luminaires/lamps, ballasts, junction boxes, cable conduits, fittings/clamps, other related accessories and hardware etc.                                                                                                                                            | 1   | ST   | 1            | 15.06.2021    |
| 7      | PS0679082999 Supply of miscellaneous items<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of miscellaneous items such as Weather monitoring system, ABT meters, metering panels, LED display for SCADA system, cable route markers, cable tags, danger boards, hoarding boards, sign boards, display boards, electrical insulation mat, checkered plates, air conditioners, tool kits, measuring instruments, SCADA office furniture etc. | 1   | ST   | 1            | 15.06.2021    |
| 8      | PS0679083006 Supply of CCTV System<br>* HSN/SAC : 8504<br>Test Certificate<br>Supply of items for CCTV System such as Cameras, Monitors, Servers, network switches, media converters, work stations, softwares, Enclosures/ racks, power supplies, cables, poles, pipes, hardware other accessories etc.                                                                                                                                     | 1   | ST   | 1            | 15.06.2021    |
| 9      | PS0679083014 Supply of safety related items<br>* HSN/SAC : 8544<br>Test Certificate<br>Supply of safety related items such as fire alarm systems for inverter station/ Control rooms, fire extinguishers, safety gadgets etc.                                                                                                                                                                                                                | 1   | ST   | 1            | 15.06.2021    |

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|  | For and On behalf of BHEL.<br><br><br>TG Pragadeesh<br>Semiconductors & Pho<br><br>2 OF 5 |
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# REQUEST FOR QUOTATION

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|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br>Electronics Division<br>PB No. 2606, Mysore Road Bangalore - 560026<br>INDIA | <b>RFQ NUMBER:</b><br><b>TGPBOS0056</b><br><br><b>RFQ DATE :</b><br>04.03.2021                                                  | Due Date/Day: 15.03.2021 MON<br>Time : 13:00 HRS<br>Tender Box : Reception Area<br>Opening Venue:<br>NEW ENGG. BLDG |
| MMI:PU:RF:003<br><br>(address for communication) :                               |                                                                                                                         | (for all correspondence)<br>Purchase Executive : TG Pragadeesh<br>Phone : 080 26998377<br>Fax :<br>E-mail: pragadeeshtg@bhel.in |                                                                                                                     |

| SI No. | Description                                                                                                                                                                                                                                                                        | Qty | Unit | Delivery qty | Delivery Date |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------------|---------------|
| 10     | PS0679083022 Supply of spare items<br>* HSN/SAC : 8544<br>Test Certificate<br><b>Supply of spare items</b>                                                                                                                                                                         | 1   | ST   | 1            | 15.06.2021    |
| 11     | PS0679083030 Supply of electrical utility items<br>* HSN/SAC : 8544<br>Test Certificate<br><b>Supply of electrical utility items such as LED luminaires, fans, exhaust fan etc for Inverter station, PEB room, security room, pooling yard, transformer yard, watch tower etc.</b> | 1   | ST   | 1            | 15.06.2021    |
| 12     | PS0679083049 I&C: Interconnection of SPV modules,<br>* HSN/SAC : 7308<br><b>I&amp;C: Interconnections of PV modules, routing of solar cables, installation of SCB, termination at SCB &amp; closing the trench.</b>                                                                | 1   | AU   | 1            | 02.08.2021    |
| 13     | PS0679083057 I&C: laying of 1cx400 sqmm cable<br>* HSN/SAC : 7308<br><b>I&amp;C: laying of DC cable from SCB to PCU, closing the trench &amp; terminating at SCB &amp; PCU ends</b>                                                                                                | 1   | AU   | 1            | 02.08.2021    |
| 14     | PS0679083065 I&C: installations of equipment<br>* HSN/SAC : 7308<br><b>I&amp;C: Installation of PCUs, transformers, HT panels &amp; other electrical equipment such as 1C to 3C cable conversion chamber dry type aux transformer, ACDB, UPS etc.</b>                              | 1   | AU   | 1            | 02.08.2021    |
| 15     | PS0679083073 I&C: cablaying from pcu to transformer<br>* HSN/SAC : 7308<br><b>I&amp;C: Laying of AC cables from PCU to transformers including installation of cable trays</b>                                                                                                      | 1   | AU   | 1            | 02.08.2021    |
| 16     | PS0679083081 I&C: laying and termination & dressing of<br>* HSN/SAC : 7308<br><b>I&amp;C: Laying &amp; termination of HT cables within solar plant and from solar plant to GETCO substation, Auxilary, Control</b>                                                                 | 1   | AU   | 1            | 02.08.2021    |

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|  | For and On behalf of BHEL.<br><br><br><b>TG Pragadeesh</b><br>Semiconductors & Pho<br><br>3 OF 5 |
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# REQUEST FOR QUOTATION

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|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br>Electronics Division<br>PB No. 2606, Mysore Road Bangalore - 560026<br>INDIA | <b>RFQ NUMBER:</b><br>TGPBOS0056<br><br><b>RFQ DATE :</b><br>04.03.2021                                                          | Due Date/Day: 15.03.2021 MON<br>Time : 13:00 HRS<br>Tender Box : Reception Area<br>Opening Venue:<br>NEW ENGG. BLDG |
| MMI:PU:RF:003<br><br>(address for communication) :                               |                                                                                                                         | (for all correspondence)<br>Purchase Executive : TG Pragaadesh<br>Phone : 080 26998377<br>Fax :<br>E-mail: pragaadeeshtg@bhel.in |                                                                                                                     |

| SI No. | Description                                                                                                                                                                                                                                                                                                                                                                                             | Qty | Unit | Delivery qty | Delivery Date |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|--------------|---------------|
|        | <b>&amp; communication cable in Inverter stations &amp; Control room</b>                                                                                                                                                                                                                                                                                                                                |     |      |              |               |
| 17     | PS0679083090 I&C: SCADA installation<br>* HSN/SAC : 7308<br>I&C of SCADA system, Weather monitoring, CCTV, Fire Alaram, Lightning Arrestors                                                                                                                                                                                                                                                             | 1   | AU   | 1            | 02.08.2021    |
| 18     | PS0679083103 I&C: earthing<br>* HSN/SAC : 7308<br>I&C: Earthing for solar array strucure, Modules, SCB, Inverter station equipment, Control room equipment                                                                                                                                                                                                                                              | 1   | AU   | 1            | 02.08.2021    |
| 19     | PS0679083111 I&C: miscellinious installation<br>* HSN/SAC : 7308<br>I&C: Installation of fire fighting system, Identification marking of cables, SCB, PCU, Transformer, Earth pit chamber, other equipments at Inverter stations and control room, placement of cable route marker, Display board & danger board & installation of other miscellinious items such as AC, furniture, lighting items etc. | 1   | AU   | 1            | 02.08.2021    |
| 20     | PS0679083120 I&C:Installation of lighting system<br>* HSN/SAC : 7308<br>I&C: Installation of lighting system for total solar plant periphery, Inverter stations, control room & PV array etc.                                                                                                                                                                                                           | 1   | AU   | 1            | 02.08.2021    |
| 21     | PS0679083138 I&C: commissioning<br>* HSN/SAC : 7308<br>I&C: Precommissioning tests & checks, commissioning & synchronization, liasoning with with govt agencies for obaining all required approvals                                                                                                                                                                                                     | 1   | AU   | 1            | 02.08.2021    |

Total Number of Items - 21

- 1.
- 2.

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|  | For and On behalf of BHEL.<br><br><br>TG Pragaadesh<br>Semiconductors & Pho<br><br>4 OF 5 |
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## REQUEST FOR QUOTATION



BHARAT HEAVY ELECTRICALS LIMITED  
Electronics Division  
PB No. 2606, Mysore Road Bangalore - 560026  
INDIA

RFQ NUMBER:  
TGPBOS0056

RFQ DATE :  
04.03.2021

Due Date/Day: 15.03.2021 MON  
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Tender Box : Reception Area  
Opening Venue:  
NEW ENGG. BLDG

MMI:PU:RF:003

(address for communication) :

(for all correspondence)

Purchase Executive : TG Pragadeesh

Phone : 080 26998377

Fax :

E-mail: pragadeeshtg@bhel.in

For and On behalf of BHEL.

TG Pragadeesh  
Semiconductors & Pho

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#### PRE QUALIFICATION CRITERIA

- 1) Vendor should have executed contracts of electrical installation of solar PV plants for a minimum cumulative of 50MW in India with each plant having minimum capacity of 5MW and at least one plant with capacity of 20MW and above within last 5 years prior to the date of publication of this tender. As evidence to this, vendor shall submit (a) copies of purchase orders (b) certificate from clients for completion of supply and erection.
- 2) Vendor should have achieved annual average financial turnover of Rs. 3 Crores in last three financial years (FY 2017-18, 18-19 and 19-20). As evidence to this, Vendor shall submit the audited balance sheets for all the 3 years.
- 3) Vendor shall submit an undertaking on his letterhead that "All electrical installation works will be carried out by a licensed electrical contractor qualified to carry out such electrical works as per CEIG norms of Gujarat state".



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
SUPPLY OF BOS ITEMS AND I&C FOR 100MW(AC)  
PHASE-2 SOLAR PV PROJECT AT RAGHANESDA ULTRA  
MEGA SOLAR PARK, GUJARAT**

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**TECHNICAL SPECIFICATION**

**FOR**

**SUPPLY OF BALANCE OF SYSTEM ITEMS AND  
INSTALLATION & COMMISSIONING**

**OF**

**GSECL 100MW(AC) PHASE-2 SOLAR PV PROJECT,**

**AT**

**RAGHANESDA ULTRA MEGA SOLAR PARK,  
DIST: BANASKANTHA, GUJARAT**

|                   |                  |               |            |
|-------------------|------------------|---------------|------------|
| Revision details: | Prepared         | Approved      | Date:      |
|                   | L. NANDA KISHORE | V. PRACHI RAO | 12.02.2021 |



## 1.0 Introduction

### 1.1 Overall outline of 100MW (AC) Phase-2 Solar PV project

Bharat Heavy Electricals Limited (BHEL) - Solar Business Division (SBD), Bangalore is setting up 100MW (AC) Phase-2 Solar Photovoltaic (SPV) power plant for GSECL at Raghnesda Ultra Mega Solar Park, Dist. Banaskantha, Gujarat.

Solar PV modules installed at the plant generate DC electricity that in turn shall be inverted to AC at approx. 620V to 760 V range by using inverters. Output of each solar block with independent Inverter stations, transformer yards and switchgear panels shall be stepped up to 33kV. Solar plant comprises of 10 Nos of Inverter stations of 8.8MW and 2 Nos of Inverter stations of 6.4MW with associated PV array and pooling stations. Output of Inverter station is combined at 33KV level in two separate 50MW pooling yards. There will be two HT panels of 50MW block of outdoor type which are mounted in two different locations from which 3 runs of 33KV, 3CX500 sq.mm cable will be laid up to GETCO substation Raghnesda sola park. Laying of this cable is included in BOS VENDOR SCOPE. MMS structures are fixed type.

The plant is envisaged to have several other infrastructural support systems such as module cleaning system for SPV modules, plant illumination system, fire alarm system, boundary fencing, approach roads, pathways, drainage system etc.

It is to be noted that all the major Electrical equipment in this Project are outdoor type.

### 1.2 Scope of this tender specification

Vendor scope includes supply, installation, testing and commissioning of certain identified activities of the solar photovoltaic power plant as detailed in this specification.

This scope includes activities but not limited to obtaining approval from BHEL/GSECL for the datasheets/ drawings/ MQP, manufacture/ testing/ inspection at manufacturer's works, packing, supply, transportation, transit insurance, delivery to site, unloading, storage, installation and commissioning of certain AC and DC side activities of power plant identified under this specification.

**Note:** The above is only a broad outline of vendor scope for the sake of introduction. The detailed vendor scope is elaborated under various other sections of this specification.

### 1.3 Enclosures to this tender specification (Tender purpose only)

|   |                                                                                                   |
|---|---------------------------------------------------------------------------------------------------|
| 1 | Tentative AC single line diagram of overall Solar PV power plant                                  |
| 2 | Tentative SPV plant layout with solar array, control room, inverter stations and pooling stations |

### 1.4 Special Instructions to vendor:

It is highly recommended that the vendor shall visit the site to assess all the technical and operational requirements and familiarize with the site conditions before placing the bid. Further, if any details/ inputs required by vendor from BHEL for submission of bid or if there are any clarifications on this technical specification, the same shall be requested through mail, at least 7 days before the tender submission due date. **Payment of GEDA registration charges for the project is in BOS vendor scope. Refer Clause 5.44 (D)**

### 2.0 Location/ address of power plant:

**GSECL 100MW (AC) Phase-2 Solar PV project,  
Raghnesda Ultra Mega Solar Park,  
Ta Vav, Banaskantha, Gujarat.**



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
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MEGA SOLAR PARK, GUJARAT**

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### 3.0 Vendor scope of supply, Installation and Commissioning

The table below indicates the scope of work for the vendor, as briefly outlined. Vendor shall submit the offer as per this list and quantity.

| #  | Scope of work (as briefly outlined)                                                                                                                                                                                                                                                                                                                    | Qty   |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1  | Supply of MC4 connectors, cable ties, HDPE conduits, cable lugs, hardware etc.                                                                                                                                                                                                                                                                         | 1 set |
| 2  | Supply of LT, Control / Instrumentation cables with cable installation accessories, hardware, termination kits etc.                                                                                                                                                                                                                                    | 1 set |
| 3  | Supply of UPS, FCBC, ACDB, UPS DB, Batteries, Aux transformer, 33KV 1C to 3C cable conversion panels etc. with all related accessories and hardware                                                                                                                                                                                                    | 1 set |
| 4  | Supply of items of earthing system for solar array field, inverter platform/ control room panels, transformer yard equipment, HT panel platforms etc. including earthing electrodes & earthing chemicals, Copper flats, earthing cables, GI wires, earth chamber lids and all related miscellaneous hardware etc.                                      | 1 set |
| 5  | Supply of lightning arrestors along with poles/masts, down conductors, all related accessories and hardware for the complete solar power plant                                                                                                                                                                                                         | 1 set |
| 6  | Supply of items for plant lighting system such as lighting poles, bend pipes, luminaires/lamps, ballasts, junction boxes, cable conduits, fittings/clamps, other related accessories and hardware etc.                                                                                                                                                 | 1 set |
| 7  | Supply of miscellaneous items such as Weather monitoring system, ABT meters, metering panels, LED display for SCADA system, cable route markers, cable tags, danger boards, hoarding boards, sign boards, display boards, electrical insulation mat, checkered plates, air conditioners, tool kits, measuring instruments, SCADA office furniture etc. | 1 set |
| 8  | Supply of items for CCTV System such as Cameras, Monitors, Servers, network switches, media converters, work stations, softwares, Enclosures/ racks, power supplies, cables, poles, pipes, hardware other accessories etc.                                                                                                                             | 1 set |
| 9  | Supply of safety related items such as fire alarm systems for inverter station/ Control rooms, fire extinguishers, safety gadgets etc.                                                                                                                                                                                                                 | 1 set |
| 10 | Supply of spare items                                                                                                                                                                                                                                                                                                                                  |       |
| 11 | Supply of electrical utility items such as LED luminaires, fans, exhaust fan etc. for Inverter station, PEB room, security room, pooling yard, transformer yard, watch tower etc.                                                                                                                                                                      | 1 set |
| 12 | I&C: Interconnections of PV modules, routing of solar cables, installation of SCB, termination at SCB & closing the trench.                                                                                                                                                                                                                            | 1 AU  |
| 13 | I&C: laying of DC cable from SCB to PCU, closing the trench & terminating at SCB & PCU ends                                                                                                                                                                                                                                                            | 1 AU  |
| 14 | I&C: Installation of PCUs, transformers, HT panels & other electrical equipment such as 1C to 3C cable conversion chamber dry type aux transformer, ACDB, UPS etc.                                                                                                                                                                                     | 1 AU  |
| 15 | I&C: Laying of AC cables from PCU to transformers including installation of cable trays                                                                                                                                                                                                                                                                | 1 AU  |
| 16 | I&C: Laying & termination of HT cables within solar plant and from solar plant to GETCO substation, Auxiliary, Control & communication cable in Inverter stations & Control room                                                                                                                                                                       | 1 AU  |
| 17 | I&C of SCADA system, Weather monitoring, CCTV, Fire Alarm, Lightning Arrestors                                                                                                                                                                                                                                                                         | 1 AU  |
| 18 | I&C: Earthing for solar array structure, Modules, SCB, Inverter station equipment, Control room equipment                                                                                                                                                                                                                                              | 1 AU  |



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
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MEGA SOLAR PARK, GUJARAT**

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|    |                                                                                                                                                                                                                                                                                                                                   |      |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 19 | I&C: Installation of firefighting system, Identification marking of cables, SCB, PCU, Transformer, Earth pit chamber, other equipment at Inverter stations and control room, placement of cable route marker, Display board & danger board & installation of other miscellaneous items such as AC, furniture, lighting items etc. | 1 AU |
| 20 | I&C: Installation of lighting system for total solar plant periphery, Inverter stations, control room & PV array etc.                                                                                                                                                                                                             | 1 AU |
| 21 | I&C: Pre-commissioning tests & checks, commissioning & synchronization, liasoning with govt. agencies for obtaining all required approvals                                                                                                                                                                                        | 1 AU |

#### 4.0 BHEL scope of supplies and works

For clarity to the vendor, other items and activities within BHEL scope of solar PV plant end of the project are listed below:

|    |                                                                                                                                                            |             |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1  | Supply of PV Modules (Min. 330Wp)                                                                                                                          | ~140 MWp    |
| 2  | Supply of DC Solar Cable, 1C x 4 sq.mm                                                                                                                     | ~350 KM     |
| 3  | Supply of DC power cable, 3.3KV, 1C x 400 sq.mm, AL, XLPE, armoured as per IS: 7098 (from SCB to PCU)                                                      | ~192 KM     |
| 4  | Supply of AC power cable, 3.3KV, 1C x 630 sq.mm, AL, XLPE, armoured as per IS: 7098 (from PCUs to Inverter transformers)                                   | ~8 KM       |
| 5  | Supply of 33kV power cable, 1C x 185 sq.mm, AL, XLPE, armoured as per IS: 7098 (for all 33kV connections within solar plant including transformer HV side) | ~32 KM      |
| 6  | Supply of 33kV power cable, 1C x 500 sq.mm & 3C X 500 sq.mm, AL, XLPE, armoured as per IS: 7098 (from solar plant to GETCO substation)                     | ~32 KM      |
| 7  | Supply of OFC cables along with termination kits. Also, termination of the cables at both ends (SCADA panels of inverter stations and Main control room)   | As required |
| 8  | Supply of Outdoor Power Conditioning Units (PCUs) of 4.4 MW rating                                                                                         | 22 Nos      |
| 9  | Supply of Outdoor Power Conditioning Units (PCUs) of 2 MW rating                                                                                           | 2 Nos       |
| 10 | Supply of String Combined Boxes (SCB)                                                                                                                      | 360 Sets    |
| 11 | Supply of inverter transformers 8.8 MVA, 33kV/690-690 V, ONAN                                                                                              | 10 Nos      |
| 12 | Supply of inverter transformers 6.4 MVA, 33kV/690-690 V, ONAN                                                                                              | 2 Nos       |
| 13 | Supply of 33kV switchgear / breaker panels                                                                                                                 | 26 Nos      |
| 14 | Supply of SCADA system including PLC panels, computers, software systems and related peripherals & accessories                                             | 1 Set       |
| 15 | Supply of GI earthing strips for PV array, Inverter station, 33 kV pooling yard, control room, interconnection yard                                        | 1 Set       |
| 16 | Supply and Installation of Module Cleaning System                                                                                                          | 1 Set       |
| 17 | Supply and Installation of Module mounting structure including module mounting                                                                             | ~7120 Sets  |
| 18 | Construction of Inverter and Aux transformer foundations including fencing                                                                                 | 1 Set       |
| 19 | Construction of platform foundation for Inverter stations and 33kV pooling yards                                                                           | 1 Set       |
| 20 | Construction of PEB type Main Control Room consisting of SCADA room, office room, conference room, store room, pantry, toilets etc.                        | 1 No.       |
| 21 | Construction of civil works such as approach roads, pathways, drains, overall plant boundary fencing, soak pit, septic tank                                | -           |
| 22 | Construction of PEB type Security cabin (2 Nos.) and Watchman cabin (4 Nos.)                                                                               | 1 Set       |
| 23 | Unloading/ storage/ security for BHEL supplied items                                                                                                       | -           |

## 5.0 Technical specification for supply, installation and commissioning

| #   | BHEL specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| 5.1 | <p><b>Temporary site office for vendor use</b></p> <p>Vendor shall make necessary office arrangements such as porta cabin, furniture, computer, printer, electrical points/ fittings etc. on their own for their use/ occupation at site during the period of project execution.</p> <p><b>Note:</b> Site offices for BHEL and GSECL shall be arranged by BHEL.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5.2 | <p><b>Electrical power / water for construction</b></p> <p>Vendor shall organize, on their own, necessary electrical power supply such as DG sets and water supply etc. required for construction activities.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5.3 | <p><b>Construction of temporary yards for safe storage of vendor supplied items</b></p> <p>Vendor shall, at a suitable location at the site, as decided based on discussions with BHEL site engineer, construct temporary yards for safe storage of vendor supplied items.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5.4 | <p><b>Unloading, safe storage and movement of supply items received at site:</b></p> <p><b>A. Items supplied by vendor</b></p> <ol style="list-style-type: none"> <li>(1) Vendor shall organize all necessary resources such as labour, machinery and tools (cranes, hydra, forklifts, transportation trucks/ trolleys, lifting accessories etc.) for unloading the items (supplied by the vendor) received at site and subsequent movement to storage yards.</li> <li>(2) Similar arrangements shall also be made by vendor for movement of the stored items from storage yards to the exact construction locations within the project site.</li> <li>(3) Vendor shall maintain proper documentation / compilation of all the records related to shipping (invoices, LRs, delivery challans, material receipt certificates etc.) and shall take approval from BHEL site engineer for every consignment. The documents shall be suitably preserved for further handing over to BHEL.</li> <li>(4) Registers shall be maintained for the yard to keep track of incoming/outgoing items.</li> <li>(5) Safety of items shall be in vendor scope. Accordingly, suitable watch and ward shall be deployed on round-the-clock basis.</li> </ol> <p><b>B. All other items (supplies from BHEL and other vendors)</b></p> <ol style="list-style-type: none"> <li>(1) Receipt, unloading, storage, security guards shall be in scope of BHEL/ other vendors.</li> <li>(2) However, movement of these items from their respective storage locations to the points of construction is in scope of vendor (excluding modules and MMS). Accordingly, vendor shall organize all necessary resources such as labour, machinery and tools (cranes, hydra, forklifts, transportation trucks/ trolleys, lifting accessories etc.) for this purpose.</li> <li>(3) Vendor shall maintain proper documentation / compilation of all the records related to receipt of material from BHEL stores and shall take approval from BHEL site engineer for every receipt of material. The documents shall be suitably preserved for further handing over to BHEL along with consumption/ usage record for all items received from BHEL.</li> </ol> |
| 5.5 | <p><b>Series interconnection of SPV modules to form strings</b></p> <p>Supply of SPV modules is in BHEL scope. Rating of module: Min. 330Wp<br/>Total quantity = ~4,27,200 Nos</p> <p>Vendor shall interconnect the SPV modules as follows:</p> <ol style="list-style-type: none"> <li>(a) Each module is fitted integrally with a junction box having positive and negative polarity cables (4 sq.mm).</li> <li>(b) Positive cable of one module shall be connected to the negative cable of adjacent module. The cables have MC4 type of connectors. One polarity cable has male type connector, while the other has female type connector.</li> <li>(c) This way, <b>30 modules</b> shall be connected in series. Each set of connections is called as a series string.</li> <li>(d) Each Module mounting structure (MMS) contains <b>60 Nos. of SPV modules</b>. Thus from each MMS, two sets of series strings (top row forms one string and bottom row forms other string) will be formed via <b>leap-frog method</b>. These two strings will be paralleled at MMS itself using <b>Y-connectors</b> to form a combined output and will be terminated at the input side of SCB as a single input. After placing the purchase order on vendor, BHEL will provide layout</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
SUPPLY OF BOS ITEMS AND I&C FOR 100MW(AC)  
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MEGA SOLAR PARK, GUJARAT**

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|            | drawings that will describe the exact way in which the series strings are formed. Vendor shall implement the interconnection as per these drawings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>5.6</b> | <p><b>Routing of DC Solar cable below the SPV modules</b></p> <p>(1) 1CX4 sq.mm cables connecting the SPV module strings to SCBs shall be suitably routed below the SPV modules and along the horizontal purlin member of MMS structure. These cables shall be dressed properly and fastened to the purlin using UV resistant cable ties of suitable length.</p> <p>(2) <b>Cable ties shall be in vendor scope of supply.</b></p> <p>(3) Cable ties of nylon polyamide 6.6 UV stabilized black, UL94 flammability rating V2, operating temperature up to 85 deg C, shall be used to arrest any possibility of movement or sagging. Cable ties shall be of make: 3M, Phoenix contact, Weidmuller, Hellermannntyton, Panduit or other reputed equivalent subject to approval of BHEL. Width and Length shall be so appropriate as to ensure that the bunched cables are held firmly to the mounting structure. Spacing between two adjacent cable ties shall be so appropriate as to ensure that there is no loose hanging of cables. During detailed engineering, BHEL approval shall be obtained for the selected brand and sizes of cable tie.</p> <p>(4) Spacing between two adjacent cable ties shall be so appropriate as to ensure that there is no loose hanging of cables.</p> <p>(5) Solar cables, wherever exposed to direct sunlight (including gaps between tables) and buried underground, shall be laid through HDPE Double Wall Corrugated (DWC) conduits.</p> |
| <b>5.7</b> | <p><b>Interconnection of SPV module strings to solar DC cables and Supply of MC4 connectors</b></p> <p>(1) Vendor shall connect two series strings of 60 SPV modules to 1CX4 sq.mm cable (copper, XLPO insulation) using <b>Y-connectors and MC4 connectors</b>.</p> <p>(2) Vendor shall supply total quantity of <b>7120 sets</b> (1 set = 2 Nos) Y-connectors and <b>7120 sets</b> (1 set = 2 Nos) MC4 connectors for array associated with each Inverter station.</p> <p>(3) Extra quantity shall be procured for any damages / pilferage during the installation by vendor at site. Such additional quantities will not be paid for. Vendor shall ensure that there shall not be any shortage during execution time.</p> <p>(4) Required sets of tool kits shall be supplied. This shall include crimping plier MC4, open end spanner set MC4, stripping plier MC4, socket wrench insert to tighten, socket wrench insert to secure, inserts suitable for cable size and MC4 connector opening tool.</p> <p>(5) MC4 connectors shall have rating of 1500VDC (IEC), rated current of 30A (min), type approved by TUV Rheinland for product safety.</p> <p>(6) Approved make: Multicontact, Bizlink, Sunlont, Elmex or other reputed equivalent subject to BHEL approval during detailed engineering.</p> <p>(7) In addition, any other required tools and tackles for crimping of cable etc. shall be arranged by vendor.</p>                                             |
| <b>5.8</b> | <p><b>Installation of SCBs including erection of SCB mounting structures</b></p> <p>(1) Supply of string Combiner boxes (SCB) is in BHEL scope. These are of <b>22-in/ 1- out type. Out of these 22 inputs, only 20 inputs will be used and two will be kept as spare.</b></p> <p>(2) SCB shall be mounted on the Module Mounting structures. Provision will be provided in the Module mounting structure to mount the SCB. However, necessary hardwares like nuts, bolts, washers etc. shall be in the vendor scope of supply.</p> <p>(3) Vendor shall install the SCBs on the module mounting structures.</p> <p>(4) All necessary labour, tools, machinery etc. for erection work shall be in vendor scope.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>5.9</b> | <p><b>Routing of DC solar cables in DWC HDPE pipes underground between the rows of solar array</b></p> <p>(1) Each SCB is connected to <b>20 strings</b>. SCBs are located in center of a string block. Where 4 sq.mm cables run vertically along MMS leg or between two rows of structure (or) where the cables cross over the pathway separation between two adjacent solar array blocks, HDPE double walled corrugated (DWC) pipe shall be provided to route the cables underground from one row/ block to the other. <b>HDPE DWC pipe together with necessary HDPE couplers/ joints (T-joints, elbows, bends etc.)</b> shall be within scope of vendor supply. Where cables run vertically along MMS leg, HDPE pipes shall be routed properly and tied/ clamped to leg.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



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|             | <p>For this, necessary <b>UV protective cable ties</b> of suitable length or clamps shall be in vendor's scope of supply.</p> <p>(2) Specification of HDPE DWC pipe: As per relevant IS; ID shall be selected to accommodate the number of 4 sq.mm cables to be guided. A maximum of 8 circuits can be run through single HDPE pipe. Fill ratio will be considered max 50% and exact ID of pipe shall be selected to ensure that only a maximum of 50% of the ID space is occupied by the cables. Make, part number, sizes/ dimensions shall be submitted for BHEL approval during detailed engineering.</p> <p>(3) Cables with HDPE pipe (and couplers/joints etc.) shall be directly buried underground as per IS: 1255. Continuous trenches shall be excavated wherever required.</p> <ol style="list-style-type: none"> <li>Trench depth = 400 mm minimum</li> <li>Trench width = As per conduit size and number of conduits</li> <li>Trench shall, then, be filled with refill soil and compacted.</li> </ol> <p>Laying of HDPE pipes, routing of cables through pipes, fixing of couplers, sealing end of the HDPE pipes, trench backfilling shall be vendor's scope. Trenches shall be backfilled, compacted and the area shall be neatly levelled.</p> <p>(4) Total length of HDPE DWC pipe and quantity of couplers/joints shall be as required.</p> <p>(5) Bending radii for cables shall be as per IS: 1255.</p> <p>(6) At road crossings, cables shall be routed through <b>Hume pipe of class NP3</b> of appropriate size that shall be in vendor scope of supply and technical details/ brand etc. shall be submitted for BHEL approval during detailed engineering.</p> <p>(7) All cable entry openings of conduit pipes, after laying/ termination of the cables, shall be sealed using appropriate sealant (single component thermoplastic insulating compound) to ensure water proof tightness. The <b>sealant supply</b> will be vendor's scope of supply.</p> <p>(8) Solar cables, wherever exposed to direct sunlight and buried underground, shall be laid through Double Wall Corrugated (DWC) HDPE conduits.</p> <p><b>Note: Trench will be excavated by MMS Vendor but other works such as laying of HDPE pipes, routing of cables, backfilling and dressing shall be done by BOS vendor. To expedite the progress of module mounting this has been included in MMS vendor scope but supervision is required from BOS vendor along with the BHEL site in-charge.</b></p> |
| <b>5.10</b> | <p><b>Termination of DC solar cables on input side of SCBs</b></p> <p>(1) 4 sq.mm cables of positive and negative polarities originating from <b>Y-CONNECORS</b> of module strings shall be terminated at the input side of SCBs.</p> <p>(2) Vendor scope includes removal of sleeve at the cable end, crimping with suitable cable lug of appropriate type/size and connecting the lugged end to the terminal block (connector) within the SCB. Cables shall enter the SCB through the cable glands that are provided as part of the SCBs supplied by BHEL.</p> <p>(3) <b>Cable lugs</b> shall be in vendor scope of supply. Type of lug (pin type etc.) shall be in accordance with the termination arrangement within the SCB. Quantity required shall be appropriately selected by the vendor (cable lug + any other hardware if required).</p> <p>(4) Any other hardware, if necessary for fulfilling the connection, such as <b>bolts, nuts, screws, washers etc.</b> shall be in vendor scope of supply. All hardware shall be of SS304.</p> <p>(5) All necessary tools such as pliers, strippers, crimping tool etc. shall be within vendor scope.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>5.11</b> | <p><b>Ferruling for DC Solar cable</b></p> <p>1) For 1CX4 sq.mm DC solar array cable, vendor shall supply and provide UV resistant ferrules printed with source/destination identification of cable. Vendor shall submit details of ferrules before printing for BHEL approval. Printing shall be of appropriate size to ensure readability.</p> <p>2) <b>Supply of ferrules</b> shall be in vendor scope.</p> <p>3) Ferrules shall be provided on all cable termination ends at module end and SCB end.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>5.12</b> | <p><b>Underground cable trenches and laying of DC power cables in solar array field</b></p> <p>(1) DC power cable 1Cx400 sq.mm, Aluminium conductor, XLPE, armoured (from SCB to PCU) shall be laid underground by way of direct burying as per IS:1255. Supply of these cables shall be in BHEL scope. Cable laying shall be carried out as per "<b>Cable installation methodology</b>" defined in this specification.</p> <p>(2) Typical trench details/dimensions are below only for tender purpose.</p> <ol style="list-style-type: none"> <li>Total trench depth = 850 mm minimum</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



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|             | <p>(b) Trench width = As per number of cables with sufficient gap to be left after every 2 groups of DC power cables</p> <p>(c) Trench shall have layers one over the other as below (from bottom to top):</p> <ol style="list-style-type: none"> <li>1. Bottom layer shall be sand of IS: 383 with 75mm minimum thickness</li> <li>2. DC cable shall be laid over the sand layer</li> <li>3. Another layer of sand of 75 mm minimum thickness.</li> <li>4. Single layer of brick as protective cover covering all cables</li> <li>5. Trench shall, then, be filled with refill soil and compacted</li> </ol> <p>(3) There will not be any communication cable from SCB to SCADA.</p> <p>(4) Bending radii for cables shall be as per IS:1255. At road crossings, cables shall be routed through Hume pipe (Class NP3) of suitable dia with maximum fill ratio of 50% that shall be in vendor scope of supply. At Nallah crossings, cables shall be routed through Covered cable trays/ structures. Hume pipe and cable trays/ structures of appropriate size shall be in vendor scope of supply, fabrication, grouting and erection.</p> <p>(5) Vendor shall take utmost care in laying the cables in order to prevent wastages and damages on outer sheath and inner insulation. Cable shall be drawn with rollers only to ensure no damage to cable during laying. In case cables found to be damaged/ cut after the laying in trenches, vendor shall implement suitable corrective action such as cable jointing, or re-lay a new cable in consultation with BHEL.</p> <p>(6) Note: <b>Trench will be excavated by MMS Vendor but other works such as laying of cables, backfilling and dressing shall be done by BOS vendor. To expedite the progress of module mounting this has been included in MMS vendor scope but supervision is required from BOS vendor along with the BHEL site in-charge. Near to inverter stations and pooling stations, where all the DC cables enter into inverters from module area, trench excavation will be under BOS vendor scope.</b></p> |
| <b>5.13</b> | <p><b>Laying of DC power cables at inverters stations and termination at PCUs</b></p> <p>(1) 1Cx400 sq.mm DC power cables running from SCBs through underground buried cable trenches shall be routed under the platform at Inverter stations. Excavation of cable trenches near inverter station shall be in BOS vendor scope.</p> <p>(2) Vendor shall carry out drilling of holes in cable gland plates of the PCUs. Gas cutting method is strictly not allowed. Vendor shall organize hole-saw cutters of appropriate size for this purpose. All necessary drilling machines / tools etc. shall be made available at site.</p> <p>(3) Prior to termination, each cable shall be checked for continuity and megger. In case any cable found defective, vendor shall implement suitable corrective action such as cable jointing, replacement/re-laying of cable etc. as applicable.</p> <p>(4) Vendor shall carry out glanding of the cables following which the glands shall be fitted to the respective holes of gland plates. Supply of glands for DC side of PCU is in BHEL scope.</p> <p>(5) Vendor shall carry out the terminations for the positive and negative inputs that include tasks such as unsleeving, crimping, connecting to the tinned copper bus bars, tightening using torque wrench etc. for all PCUs</p> <p>(7) Vendor shall arrange torque wrench of appropriate range. Torque setting shall be as per the bolt size and property class. For the setting, approval shall be obtained from BHEL site engineer.</p> <p>(8) All tools/ accessories such as crimping tools etc. required to carry out the termination shall be within scope of vendor.</p>                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>5.14</b> | <p><b>Termination of DC power cables at SCBs</b></p> <p>(1) 1Cx400 sq.mm DC power cables shall be terminated at the output side of SCBs (positive and negative terminals).</p> <p>(2) Vendor scope includes removal of sleeve at the cable end, crimping with suitable cable lug of appropriate type/size and connecting the lugged end to the tinned copper bus bar within the SCB. Cables shall enter the SCB through the cable glands that are supplied by BHEL along with SCBs.</p> <p>(3) Cable lugs for 1CX400 sq.mm DC power cable at SCBs shall be in BHEL scope of supply.</p> <p>(4) For contingency requirements arising out of shortage due to various reasons (damage, theft etc.) during installation vendor should arrange lugs and glands.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



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|             | (5) All tools/ accessories such as crimping tools etc. required to carry out the termination shall be within scope of vendor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>5.15</b> | <p><b>Supply and installation of Cable adapter boxes for PCUs</b></p> <p>(1) PCUs of 4.4MW rating (22Nos.) supplied by BHEL will have provision for termination of bus bars on AC side. BOS Vendor shall supply 22Nos. suitable adapter boxes which can be attached to PCUs and AC cables can be terminated to bus bars inside adapter box by extending AC bus bars of PCU. 2MW PCUs shall have inbuilt provision for cable connection.</p> <p>(2) Adapter box shall be of outdoor IP54 or better rated made of 3mm thick Aluminium sheet and shall be attached to the PCUs using nuts and bolts. Adapter box shall have suitable legs for grouting on the PCU platforms.</p> <p>(3) Aluminium or copper bus bars of suitable rating decided based on current calculations shall be provided in adapter box with necessary FRP insulator bushings so as to maintain phase to phase clearances between bus bars. Length of Bus bars shall be suitable for termination of 7 runs per phase of 1CX630 sq.mm cable. Necessary holes shall be provided in bus bars for terminating cables using lugs.</p> <p>(4) Bus bars of Adapter box shall be connected to bus bars inside PCUs using bus bar extension or flexible connections. All necessary hardware of SS304 shall be supplied by BOS vendor.</p> <p>(5) Bottom of Adapter boxes shall have Aluminium gland plate of min. 5mm thick suitable for entry of 6 runs per phase of 1CX630 sq.mm cable.</p> <p>(6) Drawing of Adapter box shall be supplied to BHEL for approval.</p> <p>(7) Supply of adapter boxes, fixing hardware, support structures etc. and installation and fixing to PCU shall be in vendor scope.</p> |
| <b>5.16</b> | <p><b>Laying and Termination of AC power cables at PCUs and Inverter Transformers</b></p> <p>(1) 1C x 630 sq.mm AC power Cables shall be laid between AC side of the PCU (in adapter box) and the LT side of the Inverter transformer over the cable trays. Supply of these cable trays along with the cable support structure shall be in vendor's scope. Cables shall be laid in trefoil arrangement. Trefoil clamps supply and fixing in in vendor's scope.</p> <p>(2) Vendor scope includes fixing of cable tray supports using concrete foundation, fixing of cable trays, laying of cable on trays, removal of sleeve at the cable end, crimping with suitable Bimetallic Lug or Aluminium Lug with Bimetallic washer/ strip. Cables shall enter the PCU and Transformer through the metallic cable glands.</p> <p>(3) Cable glands and lugs for 1CX630 sq.mm AC power cable at PCUs shall be in BHEL scope of supply.</p> <p><b>(4) Cable glands and lugs for 1CX630 sq.mm AC power cable at transformers shall be in BOS vendor scope of supply.</b></p> <p>(5) For contingency requirements arising out of shortage due to various reasons (damage, theft etc.) during installation vendor should arrange lugs and glands.</p> <p>(6) All tools/ accessories such as crimping tools etc. required to carry out the termination shall be within scope of vendor.</p> <p>(7) Dimensions of Cable trays shall be decided based on number of cables and size of cables. Drawing for cable tray arrangement shall be submitted to BHEL for approval.</p>                                                                                                                 |
| <b>5.17</b> | <p><b>Identification marking of cables using cable tags</b></p> <p>1) Cable tags shall be provided on all power cables at both ends just before entering the equipment enclosure and every 20 m on cable tray or trench run.</p> <p>2) Cable tags shall be of rectangular shape.</p> <p>3) Cable tag shall be of 2mm thick aluminum with number punched (embossed) on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280.</p> <p>4) Vendor shall submit the technical details of cable tags along with numbering scheme of tags for BHEL approval during detailed engineering.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>5.18</b> | <p><b>Installation of LT electrical panels at Inverter Stations (10 Nos) and Pooling stations (2 Nos) and Main Control Room (1 No.)</b></p> <p>(1) Vendor shall organize necessary resources such as labour, cranes, hydra, forklifts, transportation trucks / trolleys and other accessories for movements and positioning of the panels as below:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



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|                    | <p><b>A. At each Inverter Station on PCU platform:</b><br/> 2 Nos. 4.4MVA Outdoor PCUs (supply in BHEL scope)<br/> 1 No. Outdoor type 33KV switchgear panel of 33 KV (supply in BHEL scope)<br/> 1 No. Outdoor type SCADA panel (supply in BHEL scope)<br/> 1 No. Outdoor dry type Aux transformer (supply by BOS vendor)<br/> 1 No. Outdoor dry type ACDB panel (supply by BOS vendor)<br/> 1 No. Outdoor type UPS with battery (supply by BOS vendor)<br/> 1 No. Outdoor type Battery Charger with battery (supply by BOS vendor)</p> <p><b>B. At each Pooling Station on PCU platform:</b><br/> 1 Nos. 4.4MVA &amp; 1 No. 2MVA Outdoor PCUs (supply in BHEL scope)<br/> 8 No. Outdoor type 33KV switchgear panel of 33 KV (supply in BHEL scope)<br/> 1 No. Outdoor dry type Aux transformer (supply by BOS vendor)<br/> 1 No. Outdoor dry type ACDB panel (supply by BOS vendor)<br/> 1 No. Outdoor type SCADA panel (supply in BHEL scope)<br/> 1 No. Outdoor type UPS with battery (supply by BOS vendor)<br/> 1 No. Outdoor type Battery Charger with battery (supply by BOS vendor)</p> <p><b>C. At Main Control Room:</b><br/> 1 Set of SCADA panels and SCADA workstation (supply in BHEL scope)<br/> 1 No. Indoor type ACDB panel (supply by BOS vendor)<br/> 1 No. Indoor type UPS with battery (supply by BOS vendor)</p> <p>(2) Panels shall be moved to the respective positions and placed over the cable trenches in control room, in the exact sequence and locations as per drawings.<br/> (3) All panels shall be suitably grouted using welding/ bolting methods as per relevant standards and recommendation of OEMs. BHEL approval shall be obtained for the grouting arrangement. All necessary hardware for the same shall be within vendor scope of supply.</p>                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>5.19</b></p> | <p><b>Installation of 33kV Electrical Equipment at Inverter Stations (10 Nos) and Pooling stations (2 Nos)</b></p> <p>(1) At each Inverter station, there shall be one transformer yard having one 33KV, 8.8MVA inverter transformer and one IC-OG type switchgear panel on HT panel platform.<br/> (2) At each 50MW pooling station, there shall be one transformer yard having one 33KV, 6.4MVA inverter transformer and one HT switchboard of 8 panels (6 I/C+1O/G+1BPT) on HT panel platform.<br/> (3) Construction of RCC transformer foundations, fencing and gates for these transformer yards and pooling yards near control room and inverter station is in BHEL scope. Levelling, stone jelly, cable support structures fabrication &amp; cable tray support foundation works, all earthing related works-excavation etc. shall be in vendor's scope.<br/> (4) Vendor shall erect the inverter transformers on RCC foundation as per transformer GA details. Vendor scope of I&amp;C of transformers shall include:<br/> a) Movement of transformers and its accessory parts such as radiators, cable boxes, hardware etc. from storage yard and placement on foundation pedestal.<br/> b) Assembly of transformer parts.<br/> c) Cable laying and terminations at LV/HV/Marshalling boxes of transformers.<br/> d) All activities applicable to oil filling and filtration including measurement of oil BDV and PPM. Particularly for inverter transformers, filtration of oil shall be carried out to such an extent as to obtain the desired BDV (&gt;60 kV) and PPM (&lt;15ppm) values.<br/> e) Testing of transformers as per "<b>pre-commissioning checks</b>" section of this specification.<br/> (5) After installation of transformers at the transformer yards of each inverter station/ pooling yard near control room, vendor shall level/ compact the ground with an appropriate magnitude and direction of slope to facilitate draining of rain water away from transformer yard. Accordingly, to prevent stagnation of water within transformer yard, vendor shall implement suitable civil works in and around the transformer yard. This shall include filling</p> |



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|                         | <p>up the land (wherever necessary) with suitable soil and compact the filled-up portions either manually or with rollers, as applicable, as per site conditions, to achieve required compaction/slope.</p> <p>(6) Vendor shall supply and lay the min. 100 mm layer of stone gravels in transformer yards as per relevant IS standards / CBIP/ CEIG requirements etc.</p> <p>(7) Vendor shall provide applicable earthing connections to transformers, fencing / gates etc. in the yard as per relevant clauses under the “<b>Earthing system</b>” section of this specification.</p> <p>(8) All other items (if any, other than the above) that are required to meet the technical requirements of transformer yard as per applicable standards / electricity rules shall be incorporated by the vendor.</p> <p>(9) Vendor shall install HT switchgear panels on respective platforms at inverter stations and pooling stations as per equipment layout provided by BHEL.</p> <p>(10) After installation of HT switchgear panels, vendor shall carry out required interconnection of busbars and control wiring as per OEM recommendations.</p> <p>(11) Testing of HT switchgear panels as per “<b>pre-commissioning checks</b>” section of this specification.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| <b>5.20</b>             | <p><b>Auxiliary AC/DC power supply system</b></p> <p>1) Auxiliary power requirement of Inverter station, pooling station shall be met by tapping AC power from solar inverter output (690VAC, 3-phase, 3-wire). Auxiliary power for Main Control room shall also be met from auxiliary transformers located at pooling stations.</p> <p>2) The power tapped from solar inverter is fed to Dry type auxiliary transformers which steps down the power to 415V AC, 3-phase, 4-wire and fed to AC Distribution boards.</p> <p>3) ACDBs shall have MCCB and MFM on input side and output feeders to supply various internal loads viz. FCBC, UPS, lighting, module cleaning pumps, fans, ACs, sockets etc.</p> <p>4) There will be UPS, UPSDB and Batteries at inverter stations, pooling stations and control room to supply to HT panel, SCADA, CCTV, WMS, Fire alarm and emergency loads etc.</p> <p>5) There will be FCBC and Batteries at pooling stations to supply to HT panels.</p> <p>6) Auxiliary SLD shall be finalized during detailed engineering.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| <b>5.21</b>             | <p><b>Supply of Outdoor dry type auxiliary transformers and ACDB panels</b></p> <p>Vendor shall supply, install and commission 1 No. outdoor 30KVA dry type auxiliary transformer along with suitable outdoor type ACDB at each inverter station, 1 No. outdoor 75KVA dry type auxiliary transformer with suitable ACDB at each pooling station and 1 No. indoor type ACDB at Main Control Room.</p> <p>Preferably, vendor may use Dry type aux transformer with in-built ACDB in a single enclosure.</p> <p>Total qty of auxiliary transformers: 10 Nos. 30 KVA and 2 Nos. 75 KVA.<br/>Total qty of ACDB panels: 10 Nos. suitable for 30 KVA load and 2 Nos. suitable for 75 KVA load and 1 No. suitable for 30KVA load at control room.</p> <p><b>A. Technical Specifications of auxiliary transformers:</b></p> <table> <tr> <td>1. Type</td><td>: VPI or cast resin dry type transformer</td></tr> <tr> <td>2. Construction</td><td>: Epoxy coated Ventilated metal enclosure IP54 or better</td></tr> <tr> <td>3. Governing stds.</td><td>: IS 11171/IS2026</td></tr> <tr> <td>4. Application</td><td>: Distribution of electrical power</td></tr> <tr> <td>5. Power</td><td>: 30 KVA / 75 KVA</td></tr> <tr> <td>6. HV voltage</td><td>: 690 V</td></tr> <tr> <td>7. LV voltage</td><td>: 415 V</td></tr> <tr> <td>8. No. Of phases</td><td>: Three</td></tr> <tr> <td>9. System frequency</td><td>: 50 Hz <math>\pm</math> 3 Hz</td></tr> <tr> <td>10. Class of insulation</td><td>: F class or better</td></tr> <tr> <td>11. Insulation level</td><td>: As per IS 11171/ IS2026</td></tr> <tr> <td>12. Conductor</td><td>: Electrolytic grade copper (free from scales and burr)</td></tr> <tr> <td>13. Tapping on HV</td><td>: +5% to - 5 % in steps of 2.5 % (OCTC)</td></tr> </table> | 1. Type | : VPI or cast resin dry type transformer | 2. Construction | : Epoxy coated Ventilated metal enclosure IP54 or better | 3. Governing stds. | : IS 11171/IS2026 | 4. Application | : Distribution of electrical power | 5. Power | : 30 KVA / 75 KVA | 6. HV voltage | : 690 V | 7. LV voltage | : 415 V | 8. No. Of phases | : Three | 9. System frequency | : 50 Hz $\pm$ 3 Hz | 10. Class of insulation | : F class or better | 11. Insulation level | : As per IS 11171/ IS2026 | 12. Conductor | : Electrolytic grade copper (free from scales and burr) | 13. Tapping on HV | : +5% to - 5 % in steps of 2.5 % (OCTC) |
| 1. Type                 | : VPI or cast resin dry type transformer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 2. Construction         | : Epoxy coated Ventilated metal enclosure IP54 or better                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 3. Governing stds.      | : IS 11171/IS2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 4. Application          | : Distribution of electrical power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 5. Power                | : 30 KVA / 75 KVA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 6. HV voltage           | : 690 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 7. LV voltage           | : 415 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 8. No. Of phases        | : Three                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 9. System frequency     | : 50 Hz $\pm$ 3 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 10. Class of insulation | : F class or better                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 11. Insulation level    | : As per IS 11171/ IS2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 12. Conductor           | : Electrolytic grade copper (free from scales and burr)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |
| 13. Tapping on HV       | : +5% to - 5 % in steps of 2.5 % (OCTC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |                                          |                 |                                                          |                    |                   |                |                                    |          |                   |               |         |               |         |                  |         |                     |                    |                         |                     |                      |                           |               |                                                         |                   |                                         |



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|                    | <p>14. Type of terminals : As per IS 11171/ IS2026<br/> 15. Cooling : Air natural<br/> 16. Mounting : Outdoor<br/> 17. Ambient temperature : -5°C to 50°C<br/> 18. Vector group : Dyn11<br/> 19. Percentage Impedance : 4%<br/> 20. Termination on LV side : Cable box with MCCB<br/> 21. Termination on HV side : Cable box with MCCB<br/> 22. Indication : Winding Temperature Indication (WTI) with 4-20mA output</p> <p><b>B. Technical Specifications of ACDB panels:</b></p> <p>1. Mounting : Outdoor on concrete platforms and indoor for MCR<br/> 2. Voltage : 415V +/- 10%, 3 phase, 4 wire, neutral solidly earthed<br/> 3. Frequency : 50 Hz +/- 5%<br/> 4. Metering : MFM with accuracy class 0.5 or better and with RS485 communication<br/> 5. Isolation : MCCB of suitable rating on input side and MCBs/ MPCBs on output side<br/> 6. Construction : Epoxy coated Ventilated metal enclosure IP54 or better<br/> 7. Enclosure : CRGO sheet steel of 2mm thick for main enclosure and 1.6mm thick for internal partitions, gland plate of 3mm thick and suitable base channels with ISMC sections<br/> 8. Paint shade : light grey, RAL 7032 of IS:5, will be finalized during approval<br/> 9. Bus bars : As per sizing and temperature rise calculations to be submitted for approval during detailed engineering<br/> 10. Spare O/P feeders : 20% of each type and rating with min. one and rounded to next digit<br/> 11. Applicable standards : Relevant IS and IEC standards<br/> 12. ACDB shall have socket, panel illumination lamp and indication lamps</p> <p>Makes of auxiliary transformers and ACDBs and components and shall be reputed and shall be as approved by BHEL. Vendor shall submit GA, GTP and quality plan of auxiliary transformers and ACDBs for BHEL approval. Testing of transformers and ACDBs will be witnessed by BHEL/ GSECL prior to dispatch clearance. Type test reports from NABL accredited lab will be submitted for approval of manufacturer. Make will be approved based on type test report and credentials.</p> |
| <p><b>5.22</b></p> | <p><b>Supply of Outdoor type UPS, UPSDB and Battery</b></p> <p>Vendor shall supply, install and commission 1 No. 3KVA outdoor type Epoxy coated IP54 or better rated UPS with UPSDB and battery for each Inverter station and pooling station and 1 No. 5KVA indoor type UPS with UPSDB and battery for Main Control Room. Thus, there shall be a total of 12 Nos. 3KVA UPS and 1 No. 5KVA UPS.</p> <p>UPS shall supply to the following loads:</p> <ul style="list-style-type: none"> <li>• HT panels</li> <li>• Data logger / SCADA panel</li> <li>• Fire Detection/ Alarm Panel</li> <li>• HMI of SCADA</li> <li>• Emergency Lighting</li> <li>• CCTV System</li> </ul> <p>The UPS shall have battery backup of 4 hours. Vendor shall submit battery sizing calculations considering design margin as per standards. Battery shall be of VRLA type. For inverter stations, battery shall have suitable enclosure for outdoor mounting. Vendor may also propose a single enclosure for UPS, UPSDB and Battery. Makes of UPS and battery shall be reputed and shall be as approved by BHEL.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



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| 5.23 | <p><b>Supply of 110V Float Cum Boost Charger (FCBC) and Battery Bank</b></p> <p>Vendor shall supply 2 Nos. Outdoor type Epoxy coated IP54 or better rated 110V FCBC and Battery banks (1 No. at each pooling station) for supplying to 33KV Switchgear panels located at 2 Nos pooling stations. Each pooling station shall have 8 Nos. switchgear panels. DC load of each switchgear panel is as below:</p> <ol style="list-style-type: none"><li>1. 900W for 15 sec. momentarily for 110V DC spring charging motor.</li><li>2. 275W for 100 milli-sec for Closing/Tripping operation.</li><li>3. 300W continuously for Aux. supply to Numerical &amp; electromechanical relays, Multifunction meter &amp; indication lamps.</li></ol> <p>Vendor shall submit Battery charger and Battery sizing calculations for supplying above loads. Each FCBC shall have in built DCDB with 2 Nos. of 32A and 2 Nos. of 16A output feeders. Minimum rating of FCBC shall be 110V, 40A and of battery shall be 110V, 150AH.</p> <p>Battery bank shall be of VRLA/MF stationery, sealed type, 110V DC, with 8-hour min. back up, IS 1651-1979, performance as per IS:8702, nominal cell voltage 2V/12 V cells, plastic resin/ ABS/ PP container, epoxy coated exhaust fans to remove the gas emissions, suitable battery rack/stand with painted steel sections.</p> <p>Battery charger shall be of static type 3-phase full wave full-controlled thyristorized. Battery chargers shall be capable of continuous operation at the respective rated load in Trickle mode i.e. Trickle charging the associated DC Batteries while supplying the DC loads. The chargers shall be designed to operate, as mentioned above, at an ambient air temperature of 50°C. Battery chargers shall have a selector switch for selecting the battery charging mode i.e. whether Trickle or Boost charging. During automatic boost charging, the Battery chargers shall operate on constant current mode.</p> <p>Charger shall have load limiters which shall cause, when the voltage control is in automatic mode, a gradual lowering of the output voltage when the DC load current exceeds the load limiter setting of the Charger.</p> <p>LED indications with alarm annunciation on the panel for Mains ON, Float charger AC ON, Float charger DC ON, Boost charger AC ON, Boost charger DC ON, AC Mains Fail, Float charger DC fail, Boost charger DC fail, DC earth fault, SCR fuse fail, Filter fuse fail, Blocking diode fail, Battery under-voltage, Battery over-voltage, Charger DC overload.</p> <p>LED indications for various parameters: 3-ph AC input voltage, boost/float/trickle currents, charge/discharge currents, DC output voltage/current, Battery leakage current etc.</p> <p>Selector switches for Float Auto/Manual, Boost Auto/Manual, Float/Boost/ Auto boost selector switches. Also, Voltmeter / Ammeter selector switches as applicable.</p> <p>Makes of FCBC and battery shall be reputed and shall be as approved by BHEL.</p> |
| 5.24 | <p><b>Laying and termination of HT (33KV) power cables at inverter stations and 50MW Pooling stations associated 33KV transformer yards</b></p> <ol style="list-style-type: none"><li>1) Vendor shall lay 33KV, 1CX185 sq.mm power cables in underground cable trenches between inverter transformers to HT switchgear panels and Inverter stations to pooling stations. Supply of these cables is in BHEL scope.</li><li>2) Excavation, cables laying, sand and brick layer, dressing and backfilling etc. of HT cable trenches is in BOS vendor scope.</li><li>3) Vendor shall carry out termination of HT power cables using 33KV cable termination kits. HT terminations shall be carried out by certified jointers. Credentials / certification of experience from Raychem for the proposed jointers shall be submitted for BHEL approval during detailed engineering.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



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|             | <p>4) Supply of HT termination kits will be in vendor scope. HT termination kits shall be of Raychem make as shall be approved by BHEL.</p> <p>5) Cable glands, cable lugs, clamp &amp; connectors, cable tags, trefoil clamps, cable support structure at termination, bolts, nuts, washers etc. shall be in vendor scope of supply.</p> <p>6) Quantity of End termination and straight through jointing kits shall be supplied by vendor as follows (not including spares requirement):<br/>Indoor type 33KV (E) End termination kit for 1C X 185 sq.mm cable = <b>132 Nos</b><br/>Straight through jointing kit for 1C X 185 sq.mm (E) cable = <b>as per site requirement</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>5.25</b> | <p><b>Laying and termination of HT (33KV) power cables from 50MW pooling stations to GETCO substation in Raghanesda Solar park</b></p> <p>1) Vendor shall lay 33KV, 1CX500 sq.mm (10 runs - 3 runs per phase +1 run spare) power cables in underground cable trenches from each 50MW pooling station to 33KV/ 220KV GETCO substation in the bay allotted by GETCO. At substation, 1CX500 sq.mm cables to be converted to 3CX500 sq.mm cables (upto GIS switchgear panels of GETCO) using cable conversion panels. Supply of cables is in BHEL scope.</p> <p>2) Supply of <b>4Nos. (1 No. for each 50MW and 2 Nos. extra) outdoor type 33KV, 1C cable to 3C cable conversion panels</b> shall be in BOS vendor scope.</p> <p>3) Approx. distance between pooling stations to Substation is 1.5 KMs.</p> <p>4) Procedure for laying of cables and trench cross section shall be as per GETCO standards and drawings. Excavation, cables laying, sand and RCC slabs placement, warning tapes, dressing, backfilling, cable tags, trefoil clamps, route markers etc. of HT cable trenches as per GETCO standards and drawings is in BOS vendor scope.</p> <p>5) As per cable sizing, there shall be minimum 200mm spacing between each circuit of HT cables. In view of this, cable clamps with spacers shall be provided for every 20 meters so that cable spacing is maintained. Along with these cables, one spare cable also shall be laid for each 50MW.</p> <p>6) At road crossings, cables shall be routed through Hume pipe (min. NP3 grade) of suitable dia as per GETCO standards.</p> <p>7) Cable conversion panels shall be of reputed make as approved by BHEL and shall be manufactured as per relevant standards. Panels shall have necessary bus bars, bushings, gland plates etc. as per requirement.</p> <p>8) Construction of civil foundations and installation of cable conversion panels shall be in BOS vendor scope.</p> <p>9) Vendor shall carry out termination of HT power cables using 33KV cable termination kits at all the places as required (indoor / outdoor types as applicable). HT terminations shall be carried out by certified jointers. Credentials / certification of experience from Raychem for the proposed jointers shall be submitted for BHEL approval during detailed engineering.</p> <p>10) Supply of HT termination kits will be in vendor scope. HT termination kits shall be of Raychem make as shall be approved by BHEL.</p> <p>11) Cable glands, cable lugs, clamp &amp; connectors, cable support structure for termination of cables, bolts, nuts, washers, precast RCC slabs, spacers, cable tags, hume pipes, trefoil clamps, route markers etc. shall be in vendor scope of supply.</p> <p>12) All other items (if any, other than the above) that are required to meet the technical requirements of interconnection point as per applicable standards / electricity rules shall be incorporated by the vendor.</p> <p>13) Quantity of End termination and Straight through jointing kits shall be supplied by vendor as follows (not including spares requirement):<br/>33KV (E) Indoor type End termination kit for 1C X 500 sq.mm cable = <b>40 Nos</b><br/>33KV (E) Straight through jointing kit for 1C X 500 sq.mm cable = <b>as per site requirement</b><br/>33KV (E) Indoor type End termination kit for 3C X 500 sq.mm cable = <b>6 Nos</b><br/>33KV (E) End termination kits for 3C X 500 sq.mm cable suitable for AIS / GIS = <b>6 Nos</b><br/>33KV (E) Straight through jointing kit for 3C X 500 sq.mm cable = <b>as per site requirement</b></p> <p>14) The above activities are indicative and all works and item specifications shall be done as per GETCO/ GSECL/ BHEL requirements.</p> |



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| 5.26 | <p><b>Supply, Laying and termination of LT/ auxiliary supply cables for inverter stations, 50MW Pooling stations, 33KV transformer yards and Control room</b></p> <p>(1) Vendor shall supply and install LT Auxiliary power supply cables required for all electrical panels viz. PCUs, Transformers, HT panels, ACDB panel, Aux transformer, UPS, FCBC, Battery bank, DB boards, and inverter transformers etc. of the inverter stations, pooling stations and Control room, laying and termination of Auxiliary power cables shall be in vendor scope.</p> <p>(2) It is the responsibility of the vendor to assess the actual length requirements duly considering all applicable clearances as per relevant standards, Indian electricity rules, CEA/CEIG requirements etc. For this purpose, tentative (indicative) locations and internal layouts of inverter station, pooling station and Control rooms are enclosed along with tender.</p> <p>(3) For marshalling box of inverter transformers/ Dry type transformers/ ACDB/ UPS/ SCADA/ DB boards etc. single compression nickel plated brass glands shall be provided by vendor. Make shall be COMET or reputed equivalent subject to approval of BHEL.</p> <p>(4) All trench excavations, cable laying, sand and brick layer, backfilling etc. as per IS 1255 shall be in vendor's scope.</p> <p>(5) Vendor shall make appropriate holes in the gland plates of PCUs, HT VCB panels, ACDBs, SCADA panels, Inverter transformers, Marshalling boxes, Auxiliary transformer, Battery chargers, Distribution boards etc. for fixing the cable glands. Gas cutting is strictly prohibited. Hole-saw cutters of appropriate sizes with suitable drilling machines shall be made available at site for this purpose.</p> <p>(6) Bimetallic lugs or Aluminium lugs with bimetallic strip/washer shall be used for connecting Cu bus bar and Al cables or vice-versa wherever applicable.</p> <p>(7) Terminations with M10 and above shall be tightened using torque wrench. Torque setting shall be as per size, property class of bolt. BHEL approval shall be obtained for the settings prior to tightening.</p> <p>(8) Supply of all <b>LT Auxiliary cables</b> required shall be in BOS vendor scope. Vendor shall submit Cable schedule along with GTPs and sizing calculation for approval.</p> <p>(9) Approximate (indicative) specifications of certain power cables are as follows. Exact specification shall be based on design calculations that shall be submitted for BHEL approval during detailed engineering. Quantity shall be appropriately selected.</p> <ol style="list-style-type: none"> <li>Dry type auxiliary transformers to ACDB panels.</li> <li>AC aux power supply cables from ACDB panels in Inverter/control room to the related utility loads such as battery charger, UPS, MCB DB boxes for room appliances, PCU, transformers aux supply, SCADA, VCB panels aux supply, fire alarm system, panel illumination lamps, space heaters of VCB panels etc.</li> <li>DC aux power supply cables from FCBC panels VCB panel tripping/closing circuits, VCB panel spring charge motors etc.</li> </ol> <p>(10) Supply of all cable accessories (for the above requirements) such as cable trays, cable glands, cable lugs, ferrules, nuts/bolts/washers, cable dressing ties etc. shall be in vendor scope.</p> <p>(11) Laying of above cables, fixing of cable glands, cable termination at the respective terminal bus bars shall be in the scope of vendor</p> <p>(12) All resources such as labour, machinery, tools and accessories to carry out the above electrical works shall be in vendor scope.</p> <p>(13) All applicable/relevant clauses under "<b>General specification of LT cables</b>" and "<b>Cable installation methodology</b>" sections of this specification shall be adopted for all aspects of these cables.</p> |
| 5.27 | <p><b>Supply, Laying and installation of Control / data / instrumentation / OFC cables</b></p> <p>(1) Vendor shall supply all the control/ data/ instrumentation / communication cables except OFC and Ethernet LAN cables for SCADA.</p> <p>(2) All the cable installation accessories such as cable trays, cable conduits, cable glands, cable lugs, ferrules, cable ties, bolts, nuts, washers etc. shall be in vendor scope of supply. Cable laying and cable terminations shall be in vendor scope. All necessary resources</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



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|             | <p>such as labour, tools and accessories required to carry out laying and termination works etc. shall be in vendor scope.</p> <p>(3) <b>OFC cable</b> termination kits shall be in BHEL scope of supply. Vendor scope includes laying of the OFC cable underground in the conduit from inverter station and pooling station SCADA panels to main control room SCADA panels. Termination of the OFC cables at both the ends shall be in BHEL scope.</p> <p>(4) Vendor shall lay and terminate the <b>RS485 or Ethernet LAN cables</b> to SCADA from all plant equipment e.g. PCUs, Transformers, HT panels, ACDBs, FCBC, UPS etc. These cables shall be laid between the panels of respective inverter station/ pooling stations/ main control stations.</p> <p>(5) Vendor shall lay and terminate control and instrumentation cables from inverter transformers to HT panels, inverter transformers to SCADA and from HT breakers to SCADA.</p> <p>(6) Electrical interconnections of HT breaker panels e.g. inter panel wiring of Outgoer, incomers, Bus PT panels at 50MW pooling stations.</p> <p>(7) Suitable size ferrules with details shall be provided on either side on either side of each control/ data/ instrumentation cable.</p> <p>(8) Vendor shall submit Cable schedule along with GTPs for approval.</p> <p>(9) All applicable/relevant clauses under “<b>Cable installation methodology</b>” sections of this specification shall be adopted for all aspects of these cables.</p> <p><b>NOTE: From SCB no communication cable is required to lay to the SCADA panel.</b></p> |
| <b>5.28</b> | <p><b>Supply and installation of 33KV Metering system</b></p> <p>Vendor shall supply and install 2 sets of metering systems one set at each 50MW pooling station. Each set shall consist of an outdoor type metering panel with 2 Nos. ABT meters (1 Main and 1 Check), metering CTs and metering PTs. These meters shall be installed at solar plant end as per the requirements of GSECL/GETCO.</p> <p>Makes and specification of metering system items shall be strictly as per GETCO requirements. Vendor shall comply and coordinate with GETCO for supply, inspection, testing, installation, sealing, calibration of metering system items as per the applicable Grid Code and recommendations and provisions of GSECL / GETCO and shall also conform to the Central Electricity Authority (Installation and Operation Meters) Regulation, 2006 as amended from time to time.</p> <p>Cables from outgoing panel of HT switchgear panel shall be connected to metering panel and output of metering panels shall be taken to GETCO substation. Construction of foundations for metering panels shall be in BOS vendor scope.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>5.29</b> | <p><b>Supply and Installation of Weather monitoring system</b></p> <p>Vendor shall supply, install and commission 1 Set of weather monitoring system (WMS) consisting of Pyranometers, Anemometer, Temperature sensors and data logger with all necessary software and hardware such as power supply/ control/ data/ communication cables, support structures etc. required to integrate with SCADA.</p> <p>Scope of vendor shall also include supply and erection of all the mounting arrangements including all necessary civil works/ foundations, clamps arrangement etc. as recommended by manufacturer and required at site. Communication cables shall be laid and terminated at both SCADA station at main control room and data logger at weather monitoring station end. Similarly, power supply cables shall be laid between WMS and DB boards in main control room. Each instrument shall be supplied with necessary cables and calibration certificates traceable to WRR or WRC.</p> <p>Exact location of the weather monitoring station shall be decided during detailed engineering. Detailed specification of WMS items is as below:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### **Pyranometer (2 Nos)**

Vendor shall supply and install 2 Nos secondary standard pyranometers (ISO 9060 classification) for measuring the incidental solar radiation at horizontal and inclined plane of array. One shall be mounted horizontally and one shall be mounted in tilt position.

Specification of the pyranometer shall be as follows-

| Parameter                          | Specification                                     |
|------------------------------------|---------------------------------------------------|
| Spectral Response                  | 0.31 to 2.8 micron                                |
| Sensitivity                        | Approx. 9 micro - volt/w/m <sup>2</sup>           |
| Time response (95%)                | Maximum 15s                                       |
| Nonlinearity                       | ±0.5%                                             |
| Temperature Response               | ±2%                                               |
| Tilt error                         | <±0.5%                                            |
| Zero offset thermal radiation      | ±7 W/m <sup>2</sup>                               |
| Zero offset temperature change     | ±2 W/m <sup>2</sup>                               |
| Operating temperature range        | -40 deg. to +80 deg.                              |
| Uncertainty (95% confidence Level) | Hourly- Max-3%, Daily- Max -2%                    |
| Non-stability                      | Maximum ±0.8%                                     |
| Resolution                         | Minimum +/- 1W/m <sup>2</sup>                     |
| Output                             | Analog output: 4 – 20 mA,<br>Serial output: RS485 |

Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. The Contractor shall provide instrument manual in hard and soft form. Make of pyranometer shall be Kipp & Zonen or equivalent as approved by BHEL.

### **Temperature Sensors**

Vendor shall supply and install two thermometers (one for ambient temperature measurement with weather shield and other for module temperature measurement. The thermometers shall be RTD/ semiconductor type measuring instrument with measurement range of -5°C to 80°C. The instrument shall have valid calibration certificate. Module temperature sensor shall have suitable arrangement for proper fixing on module.

### **Anemometer and wind vane (wind speed and direction)**

Vendor shall supply and install one no. double cup anemometer with wind vane on tubular type made up of hot dipped Galvanized Iron structure for wind speed and direction monitoring. Specification of the Anemometer shall be as follows-

| Parameter                                | Specification                                                            |
|------------------------------------------|--------------------------------------------------------------------------|
| Velocity range with accuracy limit       | 0-65m/s with accuracy limit of 0.1 m/s                                   |
| Wind direction range with accuracy limit | 0 to 360° (No dead band) with +/-2° accuracy @12 m/s;<br>Resolution: 1°  |
| Mounting Bracket                         | Anodized Aluminium bracket to reduce corrosion, all mounting bolts of SS |
| Protection Class                         | IP66                                                                     |

### **Data logger and Data Acquisition System**

Vendor shall supply and install data logger for weather monitoring system. Data logger for the weather monitoring station shall be suitable for collecting data from all WMS items as listed above and shall have the following features:



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|             | <ul style="list-style-type: none"> <li>a) Provision for analog, digital and soft inputs for interfacing with various type of sensors</li> <li>b) Built-in battery backup</li> <li>c) Connectivity and Data transmission: RS485 MODBUS or Ethernet interface for data collection and storage on SCADA</li> <li>d) Display Settings: Graphic LCD screen which should be easily accessible and should display relevant details like all sensor values, battery strength, network strength etc.</li> <li>e) Data Storage: Provision for at least 2 MB internal Flash Memory and at least 8 GB Micro SD card (expandable)</li> <li>f) Enclosure Protection level: IP65 or better</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>5.30</b> | <p><b>Installation and commissioning of SCADA integration systems</b></p> <p>(1) SCADA system, supply of which shall be in BHEL scope, comprises of data station panels and PC based control desks with software to collect, store, process and report the data parameters of power plant and also to control the operations of the power plant by integrating the various equipment at the segments as follows:</p> <ul style="list-style-type: none"> <li>(a) Weather monitoring equipment: Pyranometers for solar irradiation, thermometer for ambient temperature, thermometer for module surface temperature, anemometer for wind speed and direction with data logger.</li> <li>(b) Power conditioning units: DC input / AC output parameters of inverters, grid data, fault status and events logged, etc.</li> <li>(c) Inverter transformers: Alarm/Trip signals, WTI/OTI temperature values.</li> <li>(d) 33kV VCB breaker panels (as per SLD): status of VCB breakers, status of protection relays of transformers, oil / winding temperatures, AC parameters at every 5MW level of the plant.</li> <li>(e) ACDB multifunction meters: AC auxiliary utility consumption parameters</li> <li>(f) Fire alarm system (all inverter station/ main control rooms): status signals</li> <li>(g) CCTV system</li> </ul> <p><b>(2) BHEL scope of SCADA:</b></p> <ul style="list-style-type: none"> <li>(a) Supply of Data station panels with necessary data loggers / PLCs and other accessories such as power supply etc. to integrate the data signals as listed below. This includes main panel at main control room and intermediate (linking) panels at inverter room.</li> <li>(b) Supply of Desktop PCs (HMI control desks) provided with necessary software packages and remote monitoring features.</li> <li>(c) Supply of OFC and LAN cables for SCADA.</li> <li>(d) Termination of OFC cable at SCADA panels.</li> </ul> <p><b>(3) Vendor scope of supply and installation of SCADA system:</b></p> <ul style="list-style-type: none"> <li>(a) Vendor shall install the BHEL supplied SCADA system at in the SCADA room in main control room. Vendor shall also install SCADA panels in the inverter stations and pooling stations.</li> <li>(b) Cable laying/ terminations of all SCADA cables at respective rooms/ panels / equipment including cable trench works shall be in vendor scope. BHEL will provide the necessary SCADA cabling schedule during detailed engineering.</li> <li>(c) Supply of all SCADA related control / communication cables except OFC and LAN cables shall be in vendor scope.</li> <li>(d) INTERNET CONNECTION: Internet/Intranet at Plant with Static IP: Public or private network access shall be provided at the plant through any broadband/VSAT connectivity of 2Mbps or higher bandwidth. SCADA system shall be capable of sending all plant data in real time to the Remote Server. All required hardware items such as Modem / Router / Wifi facility etc. shall be in vendor scope. Vendor shall make payment for internet connection for 6 months period from commencement of connection.</li> <li>(e) Data Communication to SLDC: Vendor shall provide required interface to integrate plant SCADA with SLDC, in compliance with grid code, to send any parameters specified by SLDC.</li> </ul> |



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|             | Note: The methodology and specification of SLDC interface will be provided separately by SLDC/GSECL and it shall be the responsibility of the vendor to obtain and implement the same as per SLDC requirements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>5.31</b> | <p><b>Supply and installation of lightning protection system (ESE type lightning arrestors) to protect the entire area of SPV plant</b></p> <p>(1) The Complete Solar PV Power plant shall be provided with Lightning and over voltage protection using Early Streamer Emission type lightning arresters (Level –IV with max. radius of 107m) as per NFC 17-102 / IEC 62305-2. The Lightning conductors shall be made to protect the entire Array Yard from Lightning stroke. The lightning protection system must be completed prior to start-up of commissioning activities of the project. The main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components. The source of over voltage can be lightning or other atmospheric disturbance.</p> <p>(2) Necessary concrete foundation for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future.</p> <p>(3) The lightning conductor shall be earthed through flats and connected to the Earth mats as per applicable Indian Standards with earth pits. Minimum two earth pits shall be provided for each lightening arrestor. Each Lightning Conductor shall be fitted with individual earth pits as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS &amp; Earth Resistance of Lightning System must be less than one (1) Ohm.</p> <p>(4) Vendor shall submit design calculations based upon rolling sphere method, detailed specifications along with layout drawings and shall got approved by BHEL.</p> <p>(5) Supply and installation of complete lightning protection items such as required quantity of ESE LAs, mounting pole/ mast, down conductor, lightning counter, test link box, earthing electrode, earthing compound, earthing chamber, concrete foundation, guy wires, lugs, hardware etc. shall be in vendor scope.</p> |
| <b>5.32</b> | <p><b>Earthing for solar array structures and SCBs</b></p> <p>Vendor shall supply and install the earthing system for solar array, MMS structures, SCBs and various other electrical equipment in line with IS 3043 latest amendments. <b>Vendor shall supply required Nos. of Earth electrode of min. 17mm dia copper bonded MS electrodes, min. 3 m length along with back fill chemical compound for array earthing. Vendor shall submit detailed design calculations for Array earthing for BHEL approval.</b> Electrode connection shall be brought out up to ground level. All earthing cables and all necessary hardwares like nut, bolts, bimetallic lugs etc. shall be in vendor's scope of supply. Supply of 25x3 and 25x6 GI earth strip shall be in BHEL scope.</p> <p>Vendor has to supply and fix the earth chamber precast/ prefab type for each earth electrode with following details.</p> <p>(a) Minimum Inner diameter shall be 300mm. Exact size shall be chosen to ensure ease of maintenance operation using spanners etc.</p> <p>(b) Projection of chamber above FGL = 150mm minimum</p> <p>(c) Cover plate with suitable lifting hooks and padlocking arrangement.</p> <p>Supply and installation of all materials related to Earth chambers shall be in vendor scope.</p> <p><b>Array Earth mat grid shall have following dimensions:</b></p> <p>(1) Earth mat grid (25X6 mm GI flat) shall be buried 600mm minimum below ground level. Where it crosses trenches, pipes, ducts, channels etc. it shall be at least 300mm below them. Back filling soil to be placed over buried conductors shall be free from stones and harmful</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



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|             | <p>mixtures. Back filling shall be placed in layers of 150 mm. Backfilled surface shall be well compacted.</p> <p>(2) Inner branches (along the solar array rows) shall be with GI flat 25x6mm (Supply of GI strip by BHEL). Inner branches shall be connected to outer grid. All excavations related to earthing in each row shall be in scope of vendor.</p> <p><b>Earthing of MMS structures shall be as follows:</b></p> <p>(1) Solar array MMS structure shall be connected to earth mat using GI flat 25x6 mm minimum; Bolting on structure (M10 minimum), Welding on earth mat end.</p> <p>(2) Adjacent structures shall be connected to one another using GI flat 25x3 mm minimum. Both ends shall be bolted (M10 minimum).</p> <p>(3) Wherever there are pathways for man movement between the adjacent structures, GI flat 25x6 mm shall be laid below the ground at a depth of 600mm from GL.</p> <p>(4) Earth strips shall be bend properly and taken along the support structure.</p> <p><b>Earthing of SCBs shall be as follows:</b></p> <p>(1) SPD earth point shall be earthed using min. 1Cx16 sq.mm (or as per recommendation of SCB vendor) flexible copper (unarmoured) green cable from SPD to SCB structure. Both ends of cable shall be suitably lugged and connected using matching hardware.</p> <p>(2) Supply of bove earthing cables along with Lugs shall be in vendor's scope of supply.</p> <p>(3) SCB structure shall be connected from structure legs (2 independent connections) to MMS leg using 25X6 GI strip for earth continuity. Earth strips shall be bend properly and taken along the support structure.</p> <p><b>General points:</b></p> <p>(a) <b>Stainless steel</b>, nuts, plain washers shall be used. Spring washers shall be zinc/epoxy coated.</p> <p>(b) All connections to equipment and earth electrodes shall be bolted connections.</p> <p>(c) Welding shall be allowed only in case of inner earth grid to outer earth grid connections. Welding for GI flats shall be using electric arc welding. Both the flats shall be overlapped for the full width where they are in perpendicular direction in same plane. Where the connection is along same line, both flats shall be overlapped for a minimum of 50mm. L-bend with weld length of 50mm minimum shall be adopted wherever overlap length to be ensured.</p> <p>(d) Resistance of welded joint shall not be more than that of GI flat.</p> <p>(e) All Welds shall be treated with red lead for rust protection and then coated with bitumen compound for corrosion protection.</p> <p>(f) Bimetallic lugs/ washers shall be used wherever copper to GI earthing is made. Supply of bimetallic lug/ washer is in vendor's scope.</p> <p>(g) While installing earthing electrodes, adding/mixing of chemical compound and water around the electrode in the dug hole shall be as per instructions of OEM.</p> <p>(h) In compliance to Rule 11 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.</p> |
| <b>5.33</b> | <p><b>Earthing system for inverter station, pooling station and Main Control Room equipment</b></p> <p><b>Vendor shall supply and install following minimum no of earth electrodes (Exact number shall be finalized cased on design calculations):</b></p> <p><b>Each Inverter stations: 15 Nos</b></p> <p><b>Each 50MW pooling stations: 20 Nos</b></p> <p><b>Main Control room: 6 Nos</b></p> <p>(1) Vendor shall design, supply, install and commission earthing system for protection against faults as guided by IEC 60364 for the inverter stations, pooling stations, main control room, 33kV transformer yards, 33Kv pooling yard and interconnection point.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
SUPPLY OF BOS ITEMS AND I&C FOR 100MW(AC)  
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- (2) Vendor shall prepare and submit the design and earthing system Layout for Inverter station, Control Room, 33Kv pooling yard, interconnection point and Transformer yards and submit for BHEL approval during detailed engineering.
  - (3) Earthing electrodes of min. 3m minimum long, min. 17 mm copper bonded MS along with chemical compound shall be in vendor scope of supply
  - (4) Bore holes of required diameter shall be made by vendor on the earth for insertion of such chemical earthing electrodes with filling of mix of chemical compound and water around. Inverter rooms and main control room shall be provided with separate earth grids.
  - (5) Earthing connections to electrical panels at Inverter stations and pooling stations:  
GI Flats 65x8 (BHEL scope of supply) shall be used for double earthing of PCUs, 33kV VCB panels, Aux Transformer, ACDB, UPS, FCBC, Battery banks, ABT metering panels, cable trays, platform metal structure and canopy. The earthing for SCADA shall be done through 1Cx 16 sq.mm copper cable.
  - (6) Earthing of inverter transformers and Aux transformer:
    - (a) Flats GI 65x8 minimum shall be provided for interconnecting various parts of the inverter transformer (for body earthing) viz tank, conservator, disconnecting chambers, cable boxes, marshaling box, radiators etc.
    - (b) Such interconnected local grid shall be double earthed to the main earth mat grid running underground through GI flats 65x8 outside 2 m from yard fence.
    - (c) Flats shall be bolted on transformer side and overlap welded to earth mat grid. Two earth pits shall be located close to each transformer for body earthing.
    - (d) Shield earthing of inverter transformers shall be separate and connected to two earth pits (connected together, isolated from earth grid) using copper flat 50x6mm
    - (e) Neutral of aux transformer shall be connected to two earth pits (connected together, isolated from earth grid) using copper flat 50X6 mm.
  - (7) Transformer yard fencing shall be earthed at every alternate post using GI flats 25x6 mm minimum to the earth grid. Gate shall be looped to the fencing mesh by way of GI wire of suitable size.
  - (8) Switchyard/ metering yard structure and equipment shall be earthed using GI flats 65x8 minimum.
  - (9) The metallic frame work of all switchyard equipment, cable trays and support structures shall be connected to the earth grid by means of two separate and distinct connections
  - (10) Earth grid shall be buried underground up to a depth of 600mm minimum from NGL. Back filling soil to be placed over buried conductors shall be free from stones and harmful mixtures. Back filling shall be placed in layers of 150 mm. Backfilled surface shall be well compacted.
  - (11) Vendor has to supply and install the brick earth chamber for each earth electrode with following details
    - a) Minimum Inner diameter shall be 300mm. Exact size shall be chosen to ensure ease of maintenance operation using spanners etc.
    - b) Projection of chamber above FGL = 150mm minimum
    - c) Cover plate cast iron cover plate with suitable lifting hooks and padlocking arrangement.
  - (12) Earth electrode shall be bolted to a horizontal GI flat 65x8 minimum that in turn bolted (M10 minimum) to two GI flat 65x8 minimum raisers on either side of horizontal flat. Raisers shall be connected to earth mat grid by way of overlap welding.
- General points:**
- (a) Only GI flats of 25X3, 25X6 and 65X8 mm shall be in BHEL scope of supply. All other items required for earthing system such as earthing electrodes, chemical, compound, earthing cables, 50X6 mm copper strip, lugs, hardware, chambers etc. shall be in vendor scope of supply.
  - (b) **Stainless steel** bolts, nuts, plain washers shall be used. Spring washers shall be zinc/epoxy coated.
  - (c) Welding for GI flats shall be using electric arc welding. Both the flats shall be overlapped for the full width where they are in perpendicular direction in same plane. Where the connection is along same line, both flats shall be overlapped for a minimum of 50mm. L-

|        | <p>bend with weld length of 50mm minimum shall be adopted wherever overlap length to be ensured.</p> <p>(d) Resistance of welded joint shall not be more than that of GI flat.</p> <p>(e) Welds shall be treated with red lead for rust protection and then coated with bitumen compound for corrosion protection.</p> <p>(f) While laying earthing electrodes, adding/mixing of chemical compound and water around the electrode in the dug hole shall be as per instructions of OEM.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
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| 5.34   | <p><b>Design, supply and installation of CCTV System</b></p> <p>1. Vendor shall design, supply and install CCTV surveillance system covering all important plant areas. Surveillance CCTV system is required to ensure effective surveillance of solar power plant area (Array yard, Inverter station, pooling stations, Main control room etc.) as well as create a tamperproof record for post event analysis.</p> <p>2. The System shall provide an online display of video images on Large LCD/LED monitors to be located in Main Control Room as well as at main security cabin in the site. System shall facilitate viewing of live and recorded images and controlling of all cameras by the authorized users.</p> <p>3. System shall provide interoperability of hardware, OS, software, networking, printing, database connectivity, reporting, and communication protocols. System expansion shall be possible through off-the-shelf available hardware.</p> <p>4. Vendor shall submit CCTV design, layout drawings with GTPs of all items for BHEL approval. No. of cameras will depend on the design of Surveillance &amp; vigilance CCTV system. The minimum locations and type of cameras are mentioned as below:</p> <table><tr><th>Sr. No</th><th>Locations</th><th>Type of Camera</th></tr><tr><td>1</td><td>Inverter platforms (12 Nos)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>2</td><td>HT panel platforms (12 Nos)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>3</td><td>Transformer Yards (12 Nos)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>4</td><td>Inside Main Control room (1 No)</td><td>Dome Type (Indoor area)</td></tr><tr><td>5</td><td>Outside Main control room (1 No)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>6</td><td>Main Gates (1 No)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>7</td><td>Weather Monitoring station (1 No)</td><td>Bullet Type (Outdoor area)</td></tr><tr><td>8</td><td>Complete Plant boundary (As reqd.)</td><td>PTZ Type (Outdoor area)</td></tr></table> <p>5. CCTV Cameras shall have low lux so that the same can operate in minimum illumination also. Cameras shall have both auto/manual focus mode and control shall also be both manual/auto.</p> <p>6. The system shall be based on Stand Alone Integrated DVR (Digital Video Recording). Specifications of Stand alone Integrated DVR:</p> <p>(i) Ability to connect Cameras as per requirement</p> <p>(ii) Facility to store 90 days of Video</p> <p>(iii) Capability to set the frame rate, contrast, brightness of each individual camera,</p> <p>(iv) Shall have facility to view live video (with audio) images in a monitor, in a PC and web browser.</p> <p>(v) Remote Administration: Shall be fully administrable/ programmable remotely through client software and web browser.</p> <p>(vi) Recording rate per channel - NTSC/30 fps per channel, PAL/25 per channel.</p> <p>(vii) Configurable/adjustable recording rate.</p> <p>(viii) Full recording and playback facilities on remote machine.</p> <p>(ix) Smart monitoring (Motion Detection).</p> <p>(x) Adjustable motion detection (motion detection sensitivity shall be adjustable).</p> <p>(xi) Ability to convert H.264 video into AVI files.</p> <p>(xii) Date and time stamping of video files.</p> <p>(xiii) Viewing for all cameras.</p> | Sr. No                     | Locations | Type of Camera | 1 | Inverter platforms (12 Nos) | Bullet Type (Outdoor area) | 2 | HT panel platforms (12 Nos) | Bullet Type (Outdoor area) | 3 | Transformer Yards (12 Nos) | Bullet Type (Outdoor area) | 4 | Inside Main Control room (1 No) | Dome Type (Indoor area) | 5 | Outside Main control room (1 No) | Bullet Type (Outdoor area) | 6 | Main Gates (1 No) | Bullet Type (Outdoor area) | 7 | Weather Monitoring station (1 No) | Bullet Type (Outdoor area) | 8 | Complete Plant boundary (As reqd.) | PTZ Type (Outdoor area) |
| Sr. No | Locations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Type of Camera             |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 1      | Inverter platforms (12 Nos)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 2      | HT panel platforms (12 Nos)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 3      | Transformer Yards (12 Nos)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 4      | Inside Main Control room (1 No)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Dome Type (Indoor area)    |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 5      | Outside Main control room (1 No)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 6      | Main Gates (1 No)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 7      | Weather Monitoring station (1 No)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Bullet Type (Outdoor area) |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |
| 8      | Complete Plant boundary (As reqd.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | PTZ Type (Outdoor area)    |           |                |   |                             |                            |   |                             |                            |   |                            |                            |   |                                 |                         |   |                                  |                            |   |                   |                            |   |                                   |                            |   |                                    |                         |



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- (xiv) Shall support backup devices like USB drive, DVD writer DVR Software must be able to take backup in DVD writer, USB drive etc.
- (xv) Shall have live display, playback, record facilities.
- (xvi) Shall have minimum 1 USB port.
7. System shall have the capability of increasing the storage capacity as and when required. It shall have low maintenance cost and shall be upgradeable to inputs for more cameras, as and when required, with minimum cost.
8. Minimum specifications for Cameras are as below:
- a) **Outdoor Bullet Type:**  
1/3" CMOS HD sensor, Out Door Bullet H.264 Compression, 2 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1920 × 1080 Low Lux, DWDR, Support Voice talk, 1CH Audio in/1CH Audio Out, Mobile P2P Viewing, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 2.8-12mm Megapixel lens (4-9mm lens optional), IR Distance: 50m, POE (802.3af). Support ROI function, Built-in Micro SD/SDHC/SDXC card slot, Ingress Protection level: IP66, Video Bit Rate 32 Kbps –8 Mbps, Audio Compression G.711/G.722.1/G.726/MP2L2, Dual Stream, BLC, ROI STANDARD: ONVIF, PSIA, CGI, ISAPI, Operating Conditions - 30°C to 60°C (-22°F to 140°F).
- b) **Indoor Dome Type:**  
1/3" CMOS HD sensor, Indoor Dome fix Lens H.264 Compression, 1.3 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1280×960, Shutter Speed: 1/3 s to 1/100,000s, Min. Illumination:0.01Lux @ (F1.2, AGC ON) ,0 Lux with IR 0.028 Lux @ (F2.0, AGC ON) ,0 Lux with IR, Video Bit Rate 32 Kbps – 8 Mbps, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 3.6mm 1.3Mega Pixel Lens SD, 3DNR, D-WDR, Motion Detection, Privacy Mask, 24pcs LED, 20m IR distance, POE(802.3af), Support Dual stream, Impact protection:IK10, operating condition, Support ROI, BLC, Standard : ONVIF, PSIA, CGI, ISAPI, Image Settings: Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser, H.264 Type: Baseline Profile / Main Profile.
- c) **Outdoor PTZ Type:**  
Image Sensor - 1/2.8", 2 MP progressive scan CMOS, PoE type, IP-66 Outdoor type, Effective Pixels 1920(H) x1080(V), Scanning System Progressive, Backlight Compensation BLC / HLC / WDR (120dB), IR LEDs Length 150m, Focal Length 4.5mm~135mm, Max Aperture F1.6 ~ F4.4, Compression H.265+/H.265/H.264+/H.264, Auto Tracking Support, IVS - Tripwire, Intrusion, Abandoned/Missing, Face Detection, Heat Map, Memory Slot Micro SD 128GB, Angle of View H: 67.8° ~ 2.4°, Close Focus Distance 100mm~ 1000mm, Optical Zoom 30x. Camera shall be suitable for operating temperature up to 60 deg Celsius ambient.
9. Other technical requirements:
- The CCTV Surveillance system shall be IP based.
  - The DVR system shall have CE certification with certificates
  - All Cameras must be provided with suitable mounts/housings Wall, Dome etc.
  - All cameras must be connected with DVR system with RG59 (with heavy gauge PVC conduits) cables and vendor must perform the necessary cabling to connect DVR with cameras.
  - The DVR system offered must be an integrated DVR system and shall not be a DVR system assembled using third party Personal Computers and DVR cards.
  - 16 channel DVR shall be able to support D1 resolution for all camera's with 16 TB HDD facility & they shall have a central management software & joystick keyboard shall be there for PTZ controlling.
  - Training: At the time of installation of equipment, the vendor shall offer free training specific to CCTV system.

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|      | <ul style="list-style-type: none"> <li>➤ CCTV vendor shall be reputed and have relevant experience of similar solutions in any of Private/ PSU/ State Govt. Supporting documents in form of customer completion letter shall be submitted at vendor approval stage to BHEL</li> <li>➤ Diagram for the Surveillance &amp; vigilance CCTV system shall be submitted for approval</li> <li>➤ Equipment with better specifications shall be accepted.</li> </ul> <p>All related supplies (camera, NVR, Network switches, server, enclosures, power supplies, all types of cables, connectors, mounting poles/ structures, min. 40" LED monitor etc.) installation including trench work, civil works etc. for CCTV system shall be in scope of vendor. All necessary labour, machinery, tools, instruments shall be in vendor scope.</p> <p>Makes of all items for CCTV system shall be reputed and shall be approved by BHEL.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5.35 | <p><b>Design, supply and installation of Plant Lighting System</b></p> <ol style="list-style-type: none"> <li>1. Vendor shall design, supply and install Illumination system (lighting) for complete plant area (Inverter Stations, Pooling stations, Main Control room, storage area, WMS, security cabin, watchman cabins, approach road, internal roads, peripheral roads, plant boundary etc.). All light fixtures shall be of LED type of min. 3-star BEE rating (IP65 or better for outdoor areas).</li> <li>2. Area lighting arrangement shall be made to illuminate the entire site at an appropriate lux level for night hours or bad light hours. Road and Perimeter LUX level shall be min. 10 and for other indoor and outdoor areas LUX level shall be as per NBC 2016.</li> <li>3. The connector box shall be made of stainless steel, Dust &amp; Vermin Proof, which is to be recessed at the base of each Yard Lighting system. The connector box shall have suitable brass or copper made connector terminal.</li> <li>4. The lighting fixtures with control gear shall be mounted on tubular GI poles of approved height and mounting arrangement.</li> <li>5. All the yard lighting towers and lighting fixtures shall be effectively grounded using adequate size of GI earthing wires / GI earthing strips.</li> <li>6. The light pole shall be fixed in separate foundation. The lighting poles shall be concreted with 600 mm coping above ground level for pole protection and 1 mtr below ground with minimum reinforcement as per IS requirement.</li> <li>7. The control gear box (non-integral type) shall be encased in the coping.</li> <li>8. Loop in – Loop out power cables shall be brought up to the control gear box through of adequate size for cable protection.</li> <li>9. The cables shall be properly glanded to the control gear box gland plate.</li> <li>10. All Cables required for plant lighting system shall be supplied and installed by vendor. XLPE/ PVC insulated armored Cu/Al cables of adequate size shall be used for interconnection and supply of power to Yard lighting systems.</li> <li>11. Cables shall be laid in underground buried cable trenches as per IS:1255.</li> <li>12. Cable terminations shall be made with suitable cable lugs &amp; sockets etc. crimped properly and passed through brass compression type cable glands at the entry &amp; exit point of the connector box and at the entry point to MCB distribution Box for controlling the yard lighting system.</li> <li>13. The height of the area lighting fixtures should not exceed 2.0 metres from ground. Lighting fixtures shall be installed close to fencing.</li> <li>14. All the wiring shall be concealed in PVC conduits of suitable size.</li> <li>15. Switchboards with required number of switches and sockets shall be provided at all places. Socket with MCB shall be provided for ACs and industrial sockets shall be provided for maintenance purposes.</li> <li>16. Power distribution board with necessary MCBs shall be provided for MCR, Security and watchman cabins.</li> <li>17. Vendor shall submit the detailed design calculations for indoor and outdoor areas using DIALUX software for type of light/ height of pole, pole foundation, cable details to meet the lux calculation GTPs of all items and lighting layout drawings of outdoor and indoor areas for BHEL approval during detailed Engg.</li> </ol> |



|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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|             | <p>18. Supply all materials (LED lights, GI poles, cables, conduits, switchboards, switches, sockets, DBs/ JB's, earthing for lighting poles etc.), installation including cable trenches and civil works shall be in vendor's scope.</p> <p>19. The lighting points and fixtures shall be of Anchor/Philips make and lights (only LED shall be used) shall be of Philips/ Syska/ Havells make. Makes of all other items for lighting system shall be reputed and shall be approved by BHEL.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>5.36</b> | <p><b>Fire Alarm and Firefighting systems</b></p> <p><b>Fire alarm system:</b><br/> Vendor shall design, supply and install intelligent microprocessor based fire alarm panel of modular construction complete with central processing unit, input and output modules, power supply module, supervision control and isolator modules with 10% spare provisions. Fire detection alarm system shall include alarm initiating devices e.g. multisensor type smoke detectors and alarm notification Appliances (Audio device). Multisensor type smoke detectors shall be provided for areas of Main Control Room. Quantity of sensors shall be decided as per design and area covered by each sensor.</p> <p><b>Fire Alarm Control Panel:</b><br/> Alarm conditions shall be immediately displayed on the control panel of Main Control Room. Alarm LED shall flash on the control panel until the alarm has been acknowledged. Once acknowledged the LED shall remain lit. A subsequent alarm received from another zone after acknowledgement shall illuminate the alarm LED and the panel display shall show the new alarm information.<br/> During an alarm condition, an alarm tone shall sound within the control panel until the alarm is acknowledged. If the audible alarm signals are silenced for any reason, they shall automatically resound if another zone is activated. All alarm signals shall be automatically "locked in" at the control panel until the operated device is returned to its normal condition and the control panel is manually reset.<br/> Fire alarm panel shall have provision for communication with SCADA.</p> <p>Vendor shall submit design for fire alarm system, GTPs and layout drawings for BHEL approval. Supply of all items for fire alarm system (fire alarm panel, sensors, cables, manual call points, hooters etc.), installation and commissioning shall be in vendor scope.</p> <p><b>Firefighting systems:</b></p> <p><b>Fire extinguishers and sand buckets</b><br/> Vendor shall provide fire extinguishers/ sand buckets for fighting fire of oils, solvents, gases, paints, varnishes, electrical wiring, live machinery fires and flammable liquid/ gas as per recommendation by relevant fire safety authority and as per relevant standards IS: 2171 and IS: 10658 marked.</p> <p>All buildings shall be installed with required no. of fire extinguishers as per relevant BIS standard and NBC. Liquefied CO2/ foam/ ABC type fire extinguisher shall be upright type of capacity 10kg conforming to IS: 2171, IS: 10658.</p> <ul style="list-style-type: none"> <li>▪ DCP type (ABC) 10 Kg designed/tested IS 15683/ IS 2171 with safety release valve, NRV and CE approved valve. Dry powder IS 14609 with standard accessories.</li> <li>▪ CO2 type 10 Kg with wheel. Designed/tested IS 2878/ IS 15683/ IS 8149 complete with hose, screw valve, CO2 gas IS 1522, cylinder IS 7285, valve IS 3224. Tested at 250 Kg/cm<sup>2</sup>.</li> <li>▪ Sand buckets should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546 at strategic locations.</li> </ul> <p>Quantities of fire extinguishers and sand buckets shall be as per relevant CEIG/ safety standards. Minimum Quantity requirements are as below:</p> |

|                                                | <table><tr><th>Type of extinguisher</th><th>DCP type (ABC) 10 Kg</th><th>CO2 type Hand 10 Kg</th><th>Foam type Hand held 9 Kg</th><th>Sand bucket stand (4 sand bucket on one stand)</th></tr><tr><td>Main control room (1 No)</td><td>3</td><td>3</td><td>3</td><td>2</td></tr><tr><td>Inverter platform (12 Nos)</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>HT panel platform at inverter station (10 Nos)</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>HT panel platform at inverter station (2 Nos)</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Transformer yard (12 Nos)</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Metering Yard</td><td>1</td><td>1</td><td>1</td><td>2</td></tr><tr><td>Security room and cabins</td><td>-</td><td>1</td><td>-</td><td>1</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Type of extinguisher | DCP type (ABC) 10 Kg     | CO2 type Hand 10 Kg                            | Foam type Hand held 9 Kg | Sand bucket stand (4 sand bucket on one stand) | Main control room (1 No) | 3 | 3 | 3 | 2 | Inverter platform (12 Nos) | 2 | 2 | 2 | 2 | HT panel platform at inverter station (10 Nos) | 1 | 1 | 1 | 1 | HT panel platform at inverter station (2 Nos) | 2 | 2 | 2 | 2 | Transformer yard (12 Nos) | 2 | 2 | 2 | 2 | Metering Yard | 1 | 1 | 1 | 2 | Security room and cabins | - | 1 | - | 1 |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|------------------------------------------------|--------------------------|------------------------------------------------|--------------------------|---|---|---|---|----------------------------|---|---|---|---|------------------------------------------------|---|---|---|---|-----------------------------------------------|---|---|---|---|---------------------------|---|---|---|---|---------------|---|---|---|---|--------------------------|---|---|---|---|
| Type of extinguisher                           | DCP type (ABC) 10 Kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | CO2 type Hand 10 Kg  | Foam type Hand held 9 Kg | Sand bucket stand (4 sand bucket on one stand) |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| Main control room (1 No)                       | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3                    | 3                        | 2                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| Inverter platform (12 Nos)                     | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2                    | 2                        | 2                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| HT panel platform at inverter station (10 Nos) | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                    | 1                        | 1                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| HT panel platform at inverter station (2 Nos)  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2                    | 2                        | 2                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| Transformer yard (12 Nos)                      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2                    | 2                        | 2                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| Metering Yard                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                    | 1                        | 2                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| Security room and cabins                       | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                    | -                        | 1                                              |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
|                                                | Makes of all items for Fire alarm and Fire fighting systems shall be reputed and shall be approved by BHEL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      |                          |                                                |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| 5.37                                           | <p><b>Identification marking using painting</b></p> <p>Following items shall be identified by way of artistic painting in black letters with yellow background. For danger symbol/text, white letters in red background. Identification number/text to be painted shall be submitted for BHEL approval during detailed engineering for the following.</p> <ul style="list-style-type: none"><li>(1) Solar array structures</li><li>(2) String combiner boxes</li><li>(3) Size/ source/ destination of DC cable with size arrow mark (power flow direction) to be painted on SCBs and PCUs</li><li>(4) PCUs front side: PCU ID number with rating 2500kW, AC chamber/ DC chamber, Danger text/ symbol.</li><li>(5) PCUs DC chamber back side: SCB ID numbers, cable size with upward arrow mark, danger text/ symbol</li><li>(6) PCUs AC chamber back side: Inverter Transformer ID, cable size with downward arrow mark, danger text/ symbol</li><li>(7) Same way as above, the corresponding panel ID with rating, cable destination with arrow mark in power flow direction, danger text/ symbol shall be painted for all VCB panels, Inverter transformers (HV and LV sides), Aux transformer (HV and LV sides) ACDB panel.</li><li>(8) For UPS/ FCBC/ SCADA/ ABT metering panels, C&amp;R panel, all DB boards/ fire alarm panels ID number shall be painted. Cable size/ destination/ arrow marks not required to be painted as cable tags shall be adequate.</li><li>(9) For earth chambers of inverter rooms, main control room, switchyard, array, ID number with resistance value and due date shall be painted.</li><li>(10) All switchboards shall be painted with ID number.</li></ul> |                      |                          |                                                |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| 5.38                                           | <p><b>Cable route markers and cables tags</b></p> <ul style="list-style-type: none"><li>(1) Cable route markers and joint markers for underground cables shall be provided along the route of the cables as per section “<b>Cable installation methodology</b>” of this specification.</li><li>(2) Cable tags shall be provided at either of the cable (at the entry point to the panel / equipment to which it is connected / terminated) shall be provided as per section “<b>Cable installation methodology</b>” of this specification.</li><li>(3) Cable tags details shall be submitted for BHEL approval during detailed engineering.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                          |                                                |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |
| 5.39                                           | <p><b>Electrical insulation mat</b></p> <ul style="list-style-type: none"><li>(1) Vendor shall supply electrical insulating mats as follows:<ul style="list-style-type: none"><li>(a) Reputed make as shall be approved by BHEL</li><li>(b) As per IS: 15652:2006</li><li>(c) Class C</li><li>(d) Max use voltage = 33 kV</li><li>(e) Thickness 3 mm minimum</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      |                          |                                                |                          |                                                |                          |   |   |   |   |                            |   |   |   |   |                                                |   |   |   |   |                                               |   |   |   |   |                           |   |   |   |   |               |   |   |   |   |                          |   |   |   |   |

|        | <p>(f) Width = 1m minimum, exact size shall be as approved by BHEL during detailed engineering.</p> <p>(g) Colour: to be approved by BHEL</p> <p>(h) Marking of IS standard on the mat</p> <p>(2) Test certificate shall be provided by vendor along with BIS license copy of manufacturer Vendor shall lay the mats in front and back of all the indoor electrical panels viz. PCUs, VCB panels, Aux transformer, ACDB panels, SCADA panels, UPS panels, battery charger, battery banks, metering panels etc.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
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| 5.40   | <p><b>Display boards and sign boards</b></p> <table><tr><th>Sl. No</th><th>Description</th><th>Qty for each inverter station/ pooling station</th><th>Qty for Control room</th></tr><tr><td>1</td><td>Board displaying instruction chart for restoration from Electric Shock</td><td>1 No</td><td>1 No</td></tr><tr><td>2</td><td>Board displaying instruction chart for artificial respiration</td><td>1 No</td><td>1 No</td></tr><tr><td>3</td><td>Board displaying dos and don'ts.</td><td>1 No</td><td>1 No</td></tr><tr><td>4</td><td>Board displaying fire extinguishers details and operations</td><td>1 No</td><td>1 No</td></tr><tr><td>5</td><td>"No smoking" board</td><td>2 Nos</td><td>5 Nos</td></tr><tr><td>6</td><td>Danger boards: 33000V with danger symbol in Hindi, GUJRATI, English</td><td>As required</td><td>As required</td></tr><tr><td>7</td><td>Identification boards, of suitable sizes, within and outside such as Inverter station, pooling station, Transformer yard, Main control room, Executive lounge, Store room, Gents toilet, Ladies toilet, SCADA room, Battery room, Pantry room etc. BHEL will provide list.</td><td>1 set</td><td>5 set</td></tr></table> <p>(a) 5mm thick sun board with LG make vinyl sticker (computerized cutting and pasting) shall be used for Sl Nos 5, 6 and 7.</p> <p>(b) For others, flex banner with design &amp; printing shall be used.</p>        | Sl. No                                         | Description             | Qty for each inverter station/ pooling station | Qty for Control room | 1 | Board displaying instruction chart for restoration from Electric Shock | 1 No         | 1 No | 2 | Board displaying instruction chart for artificial respiration | 1 No         | 1 No | 3 | Board displaying dos and don'ts. | 1 No         | 1 No | 4 | Board displaying fire extinguishers details and operations | 1 No         | 1 No | 5 | "No smoking" board               | 2 Nos        | 5 Nos | 6 | Danger boards: 33000V with danger symbol in Hindi, GUJRATI, English | As required  | As required | 7 | Identification boards, of suitable sizes, within and outside such as Inverter station, pooling station, Transformer yard, Main control room, Executive lounge, Store room, Gents toilet, Ladies toilet, SCADA room, Battery room, Pantry room etc. BHEL will provide list. | 1 set     | 5 set |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| Sl. No | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Qty for each inverter station/ pooling station | Qty for Control room    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 1      | Board displaying instruction chart for restoration from Electric Shock                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1 No                                           | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 2      | Board displaying instruction chart for artificial respiration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1 No                                           | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 3      | Board displaying dos and don'ts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1 No                                           | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 4      | Board displaying fire extinguishers details and operations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 No                                           | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 5      | "No smoking" board                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 Nos                                          | 5 Nos                   |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 6      | Danger boards: 33000V with danger symbol in Hindi, GUJRATI, English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | As required                                    | As required             |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 7      | Identification boards, of suitable sizes, within and outside such as Inverter station, pooling station, Transformer yard, Main control room, Executive lounge, Store room, Gents toilet, Ladies toilet, SCADA room, Battery room, Pantry room etc. BHEL will provide list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 set                                          | 5 set                   |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 5.41   | <p><b>Measuring instruments and Tool kits</b></p> <p><b>A. Measuring instruments</b></p> <table><tr><td>1</td><td>Earth Resistance Tester</td><td>Reputed Make</td><td>2 No</td></tr><tr><td>2</td><td>Array tester</td><td>Reputed Make</td><td>1 No</td></tr><tr><td>3</td><td>Insulation tester</td><td>Reputed make</td><td>2 No</td></tr><tr><td>4</td><td>Digital multimeter</td><td>Reputed make</td><td>2 No</td></tr><tr><td>5</td><td>Clamp meter</td><td>Reputed make</td><td>2 No</td></tr><tr><td>6</td><td>Infra-red thermal imaging camera</td><td>Reputed Make</td><td>1 No</td></tr><tr><td>7</td><td>Digital lux meter</td><td>Reputed Make</td><td>1 No</td></tr></table> <p>Note: Make / model number etc. shall be approved by BHEL prior to procurement. All testing equipment shall possess valid calibration certificate issued from approved NABL labs.</p> <p><b>B. Tool kits</b></p> <table><tr><td>1</td><td>Double ended spanner Set of sizes 10-11, 12-13, 14-15, 16-17, 17-18</td><td>2 No each</td></tr><tr><td>2</td><td>Screwdriver Set</td><td>2 Set</td></tr><tr><td>3</td><td>Crimping tool with Dye range 50-630sq-mm cable, mechanical gear power, hand operated</td><td>1 Set</td></tr><tr><td>4</td><td>Crimping tool up to 10 sq-mm cable</td><td>2 set</td></tr><tr><td>5</td><td>Drilling machine AC, hand operated, with bit size up to 20 mm</td><td>1 set</td></tr></table> | 1                                              | Earth Resistance Tester | Reputed Make                                   | 2 No                 | 2 | Array tester                                                           | Reputed Make | 1 No | 3 | Insulation tester                                             | Reputed make | 2 No | 4 | Digital multimeter               | Reputed make | 2 No | 5 | Clamp meter                                                | Reputed make | 2 No | 6 | Infra-red thermal imaging camera | Reputed Make | 1 No  | 7 | Digital lux meter                                                   | Reputed Make | 1 No        | 1 | Double ended spanner Set of sizes 10-11, 12-13, 14-15, 16-17, 17-18                                                                                                                                                                                                        | 2 No each | 2     | Screwdriver Set | 2 Set | 3 | Crimping tool with Dye range 50-630sq-mm cable, mechanical gear power, hand operated | 1 Set | 4 | Crimping tool up to 10 sq-mm cable | 2 set | 5 | Drilling machine AC, hand operated, with bit size up to 20 mm | 1 set |
| 1      | Earth Resistance Tester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Reputed Make                                   | 2 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 2      | Array tester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Reputed Make                                   | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 3      | Insulation tester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Reputed make                                   | 2 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 4      | Digital multimeter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Reputed make                                   | 2 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 5      | Clamp meter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Reputed make                                   | 2 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 6      | Infra-red thermal imaging camera                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Reputed Make                                   | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 7      | Digital lux meter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Reputed Make                                   | 1 No                    |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 1      | Double ended spanner Set of sizes 10-11, 12-13, 14-15, 16-17, 17-18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2 No each                                      |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 2      | Screwdriver Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2 Set                                          |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 3      | Crimping tool with Dye range 50-630sq-mm cable, mechanical gear power, hand operated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 Set                                          |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 4      | Crimping tool up to 10 sq-mm cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2 set                                          |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |
| 5      | Drilling machine AC, hand operated, with bit size up to 20 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1 set                                          |                         |                                                |                      |   |                                                                        |              |      |   |                                                               |              |      |   |                                  |              |      |   |                                                            |              |      |   |                                  |              |       |   |                                                                     |              |             |   |                                                                                                                                                                                                                                                                            |           |       |                 |       |   |                                                                                      |       |   |                                    |       |   |                                                               |       |



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MEGA SOLAR PARK, GUJARAT**

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|    |                                                                            |        |
|----|----------------------------------------------------------------------------|--------|
| 6  | Measuring Tape, 5m                                                         | 2 No   |
| 7  | Measuring Tape, 50 m                                                       | 1 No   |
| 8  | Allen Key set                                                              | 2 Set  |
| 9  | Adjustable spanner 2-inch size                                             | 2 No   |
| 10 | Hammer                                                                     | 1 No   |
| 11 | Rough file kit                                                             | 1 Set  |
| 12 | Platform balance, 50Kg range                                               | 1 No   |
| 13 | Cutting Pliers                                                             | 1 No   |
| 14 | Nose Pliers                                                                | 1 No   |
| 15 | Vacuum cleaner, of industrial type, for control room sweeping / cleaning.  | 1 No   |
| 16 | Blowers for cleaning the panels                                            | 1 No   |
| 17 | Battery powered wrench with bits suitable for hardwares of sizes M6 to M20 | 1 No   |
| 18 | 33KV Discharge rods                                                        | 15 Nos |

Note: Prior to procurement, vendor shall obtain approval from BHEL for the make and specification of the items.

Detailed specification of the instruments is as below:

**Earth resistance tester**

| Parameter                   | Specification                                                 |
|-----------------------------|---------------------------------------------------------------|
| Display                     | Backlit LCD or LED display                                    |
| Range                       | Earth Resistance: up to 2000 $\Omega$<br>Earth Voltage: 200 V |
| Accuracy                    | $\pm (2\% + 5)$                                               |
| Safety Ratings              | IP 56                                                         |
| Programmable Limits setting | Enabled                                                       |

**Accessories-**

Earth Ground Stakes (4 Nos)

Three cable reels with cable length up to 20 m

Carry Case-1 (capable of handling tester along with accessories)

1 set of spare battery

**Array tester**

| Parameter     | Specification                                     |
|---------------|---------------------------------------------------|
| Display       | Backlit LCD or LED display                        |
| Functionality | All electrical tests required by IEC 62446-1:2016 |
| Memory        | Up to 200 records & USB downloadable to Computer  |

**Accessories**

A set of two, 4mm fused leads for extra protection during installation tests.

Leads which enable the array tester to connect directly to PV arrays

1 set of spare battery

**Insulation tester**

| Parameter                 | Specification                                               |
|---------------------------|-------------------------------------------------------------|
| Display                   | Backlit LCD or LED display                                  |
| Insulation Test Range     | 0.1 M $\Omega$ to 10 G $\Omega$                             |
| Test Voltage              | 250V, 500V, 1000V, 5000V                                    |
| Test Voltage accuracy     | +20% on positive side only no negative variation is allowed |
| Insulation Test Current   | 1 mA nominal                                                |
| Auto Discharge            | Discharge time < 0.5 Second for C = 1                       |
| Open Circuit test Voltage | >4 V, <8 V                                                  |

**Accessories**

Heavy duty Test Lead Set – 4 Nos.

Carry Case with sufficient space for accommodating accessories.

### Digital Multimeter

| Parameter            | Specification                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Display              | Backlit LCD or LED display;<br>Minimum resolution: 5 ¾ places for DC, 4 ¾ places for AC                                                     |
| Measuring Category   | 1000V CAT III as per IEC Standard 61010-1; wave shape independent RMS measurement (True RMS) suitable for operation in the site conditions. |
| Additional Functions | Resistance ( $\Omega$ ), Temperature ( $^{\circ}\text{C}$ ), Continuity, Diode, Capacitance, Frequency, Duty cycle measurement              |

#### Accessories

Temperature Probe  
Silicon Test Lead  
Alligator Clip  
Carry Case with sufficient space for accommodating accessories.

### Clamp meter

| Parameter            | Specification                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Display              | Backlit LCD or LED display                                                                                                                  |
| Measuring Category   | 1000V CAT III as per IEC Standard 61010-1; wave shape independent RMS measurement (True RMS) suitable for operation in the site conditions. |
| Current Range        | AC&DC Current up to 1000A/400 A                                                                                                             |
| Voltage range        | AC&DC Voltage upto 1000V                                                                                                                    |
| Additional Functions | Resistance, continuity, diode and non contact voltage detection, Active, Reactive and Apparent Power, THD, PF                               |

#### Accessories

Test leads  
Electrical test leads  
Probe light & extender  
Carry Case with sufficient space for accommodating accessories.

### Infra-red thermal imaging camera

| Parameter                                     | Specification                                                                                                                                                                                                                                    |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spectral response                             | 8 $\mu\text{m}$ to 14 $\mu\text{m}$ (LW)                                                                                                                                                                                                         |
| Temperature-sensitivity and calibration range | -20 $^{\circ}\text{C}$ to +120 $^{\circ}\text{C}$                                                                                                                                                                                                |
| Atmospheric air temperature                   | -10 $^{\circ}\text{C}$ to +40 $^{\circ}\text{C}$                                                                                                                                                                                                 |
| Thermal sensitivity                           | NETD $\leq$ 0.1 K at 30 $^{\circ}\text{C}$                                                                                                                                                                                                       |
| Geometric resolution                          | 640 x 480 pixels                                                                                                                                                                                                                                 |
| Photo camera resolution                       | Approx. 30 times of IR camera resolution                                                                                                                                                                                                         |
| Absolute error of measurement                 | $< \pm 2$ K                                                                                                                                                                                                                                      |
| Adjustable parameters                         | Emissivity, ambient temperature                                                                                                                                                                                                                  |
| Adjustable functions                          | Focus, temperature level and span                                                                                                                                                                                                                |
| Measurement functions                         | Measuring spot, measuring area with average and maximum temperature                                                                                                                                                                              |
| Calibration                                   | The measuring system (Camera, lens, aperture and filter): The camera has to be traceably calibrated at least every two years. The calibration has to be documented. If the camera is not compliant, it has to be readjusted by the manufacturer. |
| Documentation                                 | Storing of the infrared picture with the radiometric data                                                                                                                                                                                        |

|                    | <p><b>Digital lux meter</b></p> <table border="1"> <tr> <th>Parameter</th><th>Specification</th></tr> <tr> <td>Range</td><td>0 – 1000 lux</td></tr> <tr> <td>Accuracy</td><td>± (2% + 5)</td></tr> <tr> <td>Resolution</td><td>1 lux</td></tr> <tr> <td>Display</td><td>3½ digits, Backlit LCD/LED</td></tr> </table> <p>All the tools and instruments are required for post-commissioning of the plant. Items shall be handed over to BHEL in new condition. Used tools and instruments will not be accepted. Any tools and instruments required by Vendor during I&amp;C activities will be arranged separately by vendor.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Parameter | Specification                                   | Range  | 0 – 1000 lux                                                                           | Accuracy | ± (2% + 5)                             | Resolution | 1 lux | Display | 3½ digits, Backlit LCD/LED |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------|--------|----------------------------------------------------------------------------------------|----------|----------------------------------------|------------|-------|---------|----------------------------|
| Parameter          | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| Range              | 0 – 1000 lux                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| Accuracy           | ± (2% + 5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| Resolution         | 1 lux                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| Display            | 3½ digits, Backlit LCD/LED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| <p><b>5.42</b></p> | <p><b>Supply and Installation Miscellaneous Items</b></p> <p>Vendor shall supply and install following items:</p> <ol style="list-style-type: none"> <li>(1) Split Air conditioner of 1.5 tonne 5-star rating (4 Nos) of for SCADA room, conference room and office room of Voltas/ Hitachi/ Samsung/LG make.</li> <li>(2) Exhaust fans for PEB Control room (5 Nos) and wall mounted fans in each security rooms (2 Nos) and security cabins (4 Nos) shall be supplied and installed. The fans shall be of Khaitan/ Usha/ Bajaj make</li> <li>(3) Furniture for SCADA room: <ul style="list-style-type: none"> <li>• Table with drawer for desktop PC – 5 Nos</li> <li>• Chair, industry standard, revolving type, with wheels, arm rest, provisions for adjustment of height (hydraulic/ gas lift): 5 Nos</li> <li>• Storage almirah: 4 No</li> <li>• Filing cabinet: 4 No</li> <li>• Printer table: 1 No</li> </ul> </li> <li>(4) Furniture for Conference Room: <ul style="list-style-type: none"> <li>• LED TV of 48 inch of Sony/ Phillips / Samsung make – 1 No.</li> <li>• Conference table of 10 person equipped power sockets and 10 chairs revolving type with wheels – 1 Set</li> <li>• 2+1 seater Sofa – 1 Set</li> <li>• All-in-one printer cum scanner- 1 No</li> <li>• Landline phone</li> <li>• Refrigerator (150 litre) of Voltas/Godrej/Whirlpool make</li> <li>• projector and screen of 2m x 2m</li> </ul> </li> <li>(5) Furniture for security room and security cabins <ul style="list-style-type: none"> <li>• Table with drawers – 2Nos</li> <li>• Chairs revolving type with arm rest – 10 Nos</li> </ul> </li> </ol> <p>Note: Make of the above mentioned furniture shall be Godrej/ DURIAN/ ZUARI or equivalent. Make of other items shall be reputed and shall be approved by BHEL.<br/>The above list is tentative only actual will be given at the time of procurement</p> |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| <p><b>5.43</b></p> | <p><b>Cable installation Methodology</b></p> <p><b>1. CODES AND STANDARDS</b></p> <p>All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS codes, standards, etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following standards/ codes as applicable.</p> <table> <tr> <td>IS:513</td><td>Cold rolled low carbon steel sheets and strips.</td></tr> <tr> <td>IS:802</td><td>Code of practice for the use of Structural Steel in Overhead Transmission Line Towers.</td></tr> <tr> <td>IS:1079</td><td>Hot Rolled carbon steel sheet &amp; strips</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | IS:513    | Cold rolled low carbon steel sheets and strips. | IS:802 | Code of practice for the use of Structural Steel in Overhead Transmission Line Towers. | IS:1079  | Hot Rolled carbon steel sheet & strips |            |       |         |                            |
| IS:513             | Cold rolled low carbon steel sheets and strips.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| IS:802             | Code of practice for the use of Structural Steel in Overhead Transmission Line Towers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |
| IS:1079            | Hot Rolled carbon steel sheet & strips                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |                                                 |        |                                                                                        |          |                                        |            |       |         |                            |



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| IS:1239                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mild steel tubes, tubulars and other wrought steel fittings                                                                                    |
| IS:1255                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Code of practice for installation and maintenance of power cables upto and including 33 KV rating                                              |
| IS:1367 Part-13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Technical supply conditions for threaded Steel fasteners. (Hot dip galvanized coatings on threaded fasteners).                                 |
| IS:2147                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Degree of protection provided by enclosures for low voltage switchgear and control gear                                                        |
| IS:2309                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Code of Practice for the protection of building and allied structures against lightning.                                                       |
| IS:2629                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Recommended practice for hot dip galvanizing of iron & steel                                                                                   |
| IS:2633                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Method for testing uniformity of coating on zinc coated articles.                                                                              |
| IS:3043                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Code of practice for Earthing                                                                                                                  |
| IS:3063                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Fasteners single coil rectangular section spring washers.                                                                                      |
| IS:6745                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Methods for determination of mass of zinc coating on zinc coated iron & steel articles.                                                        |
| IS:8308                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Compression type tubular in- line connectors for aluminium conductors of insulated cables                                                      |
| IS:8309                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Compression type tubular terminal ends for aluminium conductors of insulated cables.                                                           |
| IS:9537                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Conduits for electrical installation.                                                                                                          |
| IS:9595                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Metal - arc welding of carbon and carbon manganese steels - recommendations.                                                                   |
| IS:13573                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Joints and terminations for polymeric cables for working voltages from 6.6kv up to and including 33kv performance requirements and type tests. |
| BS:476                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Fire tests on building materials and structures                                                                                                |
| IEEE:80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | IEEE guide for safety in AC substation grounding                                                                                               |
| IEEE:142                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Grounding of Industrial & commercial power systems                                                                                             |
| DIN 46267 (Part-II)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Non tension proof compression joints for Aluminium conductors.                                                                                 |
| DIN 46329                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Cable lugs for compression connections, ring for Aluminium conductors                                                                          |
| VDE 0278                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Tests on cable terminations and straight through joints                                                                                        |
| BS:6121                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Specification for mechanical Cable glands elastomers and plastic insulated cables.                                                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Indian Electricity Act                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Indian Electricity Rules.                                                                                                                      |
| <p>Equipment complying with other internationally accepted standards such as IEC, BS, DIN, USA, VDE, NEMA etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards along with copies of all official amendments and revisions in force as on date of opening of bid and shall clearly bring out the salient features for comparison.</p> |                                                                                                                                                |
| <p><b>2. DESIGN AND CONSTRUCTIONAL FEATURE</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                |
| <p><b>Inter Plant Cabling</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                |
| <p>Interplant cabling for main routes shall be laid in Cable trenches/duct banks. Cables from main plant to control room shall be laid in Cable trenches/duct banks. In case of Duct banks, pull-pits shall be filled with sand and provided with a PCC covering. Directly buried cables, if essential, shall not have concentration of more than 4 cables in one route. All buried cables shall be armoured.</p>                                                                                                                                                  |                                                                                                                                                |
| <p><b>Trenches</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                |
| <p>PCC flooring of built up trenches shall be sloped for effective drainage with sump pits and sump pumps.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                |



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
SUPPLY OF BOS ITEMS AND I&C FOR 100MW(AC)  
PHASE-2 SOLAR PV PROJECT AT RAGHANESDA ULTRA  
MEGA SOLAR PARK, GUJARAT**

PS-439-1363

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No subzero level cable vault/trenches shall be provided below control building/switchgear rooms in plant.

**General**

The cable slits to be used for motor/equipment power/control supply shall be sand filled & covered with PCC after cabling.

Sizing criteria, derating factors for the cables shall be met as per respective chapters. However, for the power cables, the minimum conductor size shall be 6 sq.mm. for aluminium conductor and 2.5 sq.mm. for copper conductor cable.

Conscious exceptions to the above guidelines may be accepted under special conditions but suitable measures should be taken at such location to:

- Meet all safety requirements
- Safeguard against fire hazards, mechanical damage, flooding of water, oil accumulation, electrical faults/interferences, etc.

**3. Cable accessories**

**3.1 Cable trays, Fittings & Accessories**

- a) Cable trays shall be ladder/perforated type as specified complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required. Cable tray shall be ladder type for power & control cables and perforated for instrumentation cables.
- b) Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized as per relevant IS.
- c) Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 meter. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be 3 mm.
- d) Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanized as per relevant IS. Troughs shall be standard width of 50 mm & 75 mm with depth of 25 mm.

**3.2 Support System for Cable Trays**

- (a) Cable tray support system shall be pre-fabricated similar or equivalent to "Unistrut make".
- (b) Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types: (i) C1:- having provision of supporting cable trays on one side and (ii) C2:-having provision of supporting cable trays on both sides. The support system shall be the type described hereunder:
  1. Cable supporting steel work for cable racks/cables shall comprise of various channel sections, cantilever arms, various brackets, clamps, floor plates, all hardwares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc.
  2. The system shall be designed such that it allows easy assembly at site by using bolting. All cable supporting steel work, hardwares, fittings and accessories shall be prefabricated factory galvanized.
  3. The main support and cantilever arms shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hardware etc. to form various arrangements required to support the cable trays. Welding of the components shall not be allowed. However, welding of the bracket (to which the main support channel is bolted) to the overhead beams, structural steel, insert plates or reinforcement bars will be permitted.



Any cutting or welding of the galvanized surface shall be brushed and red lead primer, oil primer & Aluminium paint shall be applied.

4. All steel components, accessories, fittings and hardware shall be hot dip galvanized after completing welding, cutting, drilling and other machining operation.
5. Support system shall be able to withstand
  - weight of the cable trays
  - weight of the cables (75 Kg/ Meter run of each cable tray)
  - Concentrated load of 75 Kg between every support span.
  - Factor of safety of minimum 1.5 shall be considered.

### **3.3 Pipes, Fittings & Accessories**

- a) Pipes offered shall be complete with fittings and accessories (like tees, elbows, bends, check nuts, bushings, reducers, enlargers, coupling caps, nipples etc.) The size of the pipe shall be selected on the basis of maximum 40% fill criteria
- b) GI Pipes shall be of medium duty as per IS:1239
- c) Duct banks shall be High Density PE pipes encased in PCC (10% spare of each size, subject to minimum one) with suitable water-proof manholes.
- d) Hume pipes shall be NP3 type as per IS 458.

### **3.4 Junction Boxes**

- a) Junction Boxes with IP:55 degree of protection, shall comprise of a case with hinged door constructed from cold rolled sheet steel of thickness 2mm. Top of the boxes shall be arranged to slope towards rear of the box. Gland plate shall be 3mm thick sheet steel with neoprene/synthetic rubber gaskets. All junction boxes shall be of adequate strength and rigidity, hot dip galvanized as per relevant IS, and suitable for mounting on wall, columns, structures etc. The boxes shall include brackets, bolts, nuts, screws M8 earthing stud etc. required for installation.
- b) Terminal blocks shall be 1100V grade, 10Amps rated, made up of unbreakable polyamide 6.6 grade. The terminals shall be screw type or screw-less (spring loaded) / cage clamp type with lugs. Marking on terminal strips shall correspond to the terminal numbering in wiring diagrams. All metal parts shall be of non-ferrous material. In case of screw type terminals the screw shall be captive, preferably with screw locking design. All terminal blocks shall be suitable for terminating on each side two (2) nos. stranded copper conductors of size upto 2.5 sq.mm each. All internal wiring shall be of minimum 1.5 sq. mm cu. Conductor PVC wire.

### **3.5 Terminations & Straight Through Joints**

- a) Termination and jointing kits for 33kV, 11kV, 6.6 kV and 3.3 kV grade XLPE insulated cables shall be of proven design and make which have already been extensively used and type tested. Termination kits and jointing kits shall be pre-moulded type, taped type or heat shrinkable type. 33kV, 11kV and 6.6 kV grade joints and terminations shall be type tested as per IS: 13573. 3.3kV grade joints and terminations shall be type tested as per VDE0278. Critical components used in cable accessories shall be of tested and proven quality as per relevant product specification/ESI specification. Kit contents shall be supplied from the same source as were used for type testing. The kit shall be complete with the aluminium solderless crimping type cable lugs & ferrule as per DIN standard.
- b) Straight through joint and termination shall be capable of withstanding the fault level for the system.
- c) 1.1 KV grade Straight Through Joint shall be of proven design and make shall be approved by BHEL.

### **3.6 Cable glands**

Cable shall be terminated using double compression type cable glands. Cable glands shall conform to BS: 6121 and be of robust construction capable of clamping cable and cable



armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.

### **3.7 Cable lugs/ferrules**

Cable lugs/ferrules for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper type. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipments. Cable lugs and ferrule shall conform to relevant standard.

### **3.8 Trefoil clamps**

Trefoil clamps for single core cables shall be pressure die cast aluminum or fibre glass or nylon and shall include necessary fixing accessories like G.I. nuts, bolts, washers, etc. Trefoil clamps shall have adequate mechanical strength to withstand the forces generated by the peak value of maximum system short circuit current.

### **3.9 Cable Clamps & Straps**

The cable clamps required to clamp multicore cables on vertical run shall be made up of Aluminium strip of 25x3 mm size. For clamping the multicore cables, self-locking, de-interlocking type nylon clamps/straps shall be used. The clamps/straps shall have sufficient strength and shall not get affected by direct exposure to sun rays and outdoor environment.

### **3.10 Receptacles**

Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped galvanized or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double break, AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded Aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polyamide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with inbuilt ELCB rated for suitable mA sensitivity.

### **3.11 Galvanizing**

- Galvanizing of steel components and accessories shall conform to IS: 2629, IS: 4759 & IS: 2633. Additionally, galvanizing shall be uniform, clean smooth, continuous and free from acid spots.
- The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS: 1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.

### **3.12 Welding**

The welding shall be carried out in accordance with IS: 9595. All welding procedures and welders qualification shall also be followed strictly in line with IS: 9595.



#### **4. CABLE INSTALLATION**

##### **4.1 Cable tray and Support System Installation**

- a) Cables shall run in cable trays mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures.
- b) Horizontally running cable trays shall be clamped by bolting to cantilever arms and vertically running cable trays shall be bolted to main support channel by suitable bracket/clamps on both top and bottom side rails at an interval of 2000 mm in general. For vertical cable risers/shafts cable trays shall be supported at an interval of 1000mm in general. Fixing of cable trays to cantilever arms or main support channel by welding shall not be accepted. Cable tray installation shall generally be carried out as per the approved guidelines/ drawings. Vendor shall design the support system along with tray, spacing etc. in line with relevant standard.
- c) The cantilever arms shall be positioned on the main support channel with a minimum vertical spacing of 300 mm unless otherwise indicated.
- d) The contractor shall fix the brackets/ clamps/ insert plates using anchor fasteners. Minimum size of anchor fasteners shall be M 8 X 50 and material shall be stainless steel grade 316 or better. Anchor fastener shall be fixed as recommended by manufacturer and as approved by site engineer. For brick wall suitable anchor fasteners shall be used as per the recommendations of manufacturer. Make of anchor fasteners subject to QA approval.
- e) All cable way sections shall have identification, designations as per cable way layout drawings and painted/stenciled at each end of cable way and where there is a branch connection to another cable way. Minimum height of letter shall be not less than 75 mm. For long lengths of trays, the identification shall be painted at every 10 meter. Risers shall additionally be painted/ stenciled with identification numbers at every floor.
- f) In certain cases it may be necessary to site fabricate portions of trays, supports and other non- standard bends where the normal prefabricated trays, supports and accessories may not be suitable. Fabricated sections of trays, supports and accessories to make the installation complete at site shall be neat in appearance and shall match with the prefabricated sections in the dimensions. They shall be applied with one coat of red lead primer, one coat of oil primer followed by two finishing coats of aluminium paint.

##### **4.2 Conduits/ Pipes/ Ducts Installation**

- a) The Contractor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All openings in the floor/roof/wall / cable tunnel/cable trenches made for conduit installation shall be sealed and made water proof by the Contractor.
- b) GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc.
- c) Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/Cement Mortar/Putty to prevent entrance of moisture and foreign material.
- d) Exposed conduit/pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with an average spacing between the supports as given below, unless specified otherwise

| <b>Conduit /pipe size (dia).</b> | <b>Spacing</b> |
|----------------------------------|----------------|
| Upto 40 mm                       | 1 M            |
| 50 mm                            | 2.0 M          |
| 65-85 mm                         | 2.5 M          |
| 100 mm and above                 | 3.0 M          |



- e) For bending of conduits, bending machine shall be arranged at site by the contractor to facilitate cold bending. The bends formed shall be smooth.

#### **4.3 Junction Boxes Installation**

Junction boxes shall be mounted at a height of 1200mm above floor level or as specified in the drawings and shall be adequately supported/mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.

#### **4.4 Cable Installation**

- a) Cable installation shall be carried out as per IS: 1255 and other applicable standards.
- b) For Cable unloading, pulling etc. following guidelines shall be followed in general:
- Cable drums shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink. In no case shall be drum be stored flat i.e. with flange horizontal. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cables. For unreeling the cable, the drum shall be mounted on suitable jacks or on cable wheels and shall be rolled slowly so that cable comes out over the drum and not from below. All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends. Cable ends shall be provided with sealed plastic caps to prevent damage and ingress of moisture.
  - While laying cable, ground rollers shall be used at every 2-meter interval to avoid cable touching ground. The cables shall be pushed over the rollers by a gang of people positioned in between the rollers. Cables shall not be pulled from the end without having intermediate pushing arrangements. Pulling tension shall not exceed the values recommended by cable manufacturer. Selection of cable drums for each run shall be so planned so as to avoid using straight through joints. Care should be taken while laying the cables so as to avoid damage to cables. If any particular cable is damaged, the same shall be repaired or changed to the satisfaction of Project Manager.
- c) Cables shall be laid on cable trays strictly in line with cable schedule
- d) Power and control cables shall be laid on separate tiers in line with approved guidelines/drawings. The laying of different voltage grade cables shall be on different tiers according to the voltage grade of the cables. In horizontal tray stacks, HT cables shall be laid on topmost tier and cables of subsequent lower voltage grades on lower tiers of trays. Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two meter. All multi core cables shall be laid in touching formation. Power and control cables shall be secured fixed to trays/support with self locking type nylon cable straps with de-interlocking facilities. For horizontal trays arrangements, multi core power cables and control cables shall be secured at every five meter interval. For vertical tray arrangement, individual multi core power cables and control cables shall be secured at every one meter by nylon cable strap. After completion of cable laying work in the particular vertical tray, all the control cables shall be binded to trays/supports by aluminium strips at every 5 meter interval and at every bend.
- e) Bending radii for cables shall be as per manufacturer's recommendations and IS: 1255.
- f) Where cables cross roads/rail tracks, the cables shall be laid in hume pipe/ HDPE pipe.
- g) No joints shall be allowed in trip circuits, protection circuits and CT/PT circuits. Also joints in critical equipment in main plant area shall not be permitted. Vendor shall identify and accordingly procure the cable drum length.
- h) In each cable run some extra length shall be kept at suitable point to enable one LT/two HT straight through joints to made, should the cable develop fault at a later stage.

- Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.
- Wherever few cables are branching out from main trunk route troughs shall be used.
  - Wind loading shall be considered for designing support as well Cable trays wherever required.
  - Where there is a considerable risk of steam, hot oil or mechanical damage cable routes shall be protected by barriers or enclosures.
  - The installation work shall be carried out in a neat workman like manner & areas of work shall be cleaned of all scraps, water, etc. after the completion of work in each area every day. Contractor shall replace RCC/Steel trench covers after the Installation work in that particular area is completed or when further work is not likely to be taken up for some time.

#### **4.5 Separation**

At least 300mm clearance shall be provided between:

- HT power & LT power cables,
- LT power & LT control/instrumentation cables,

#### **4.6 Segregation**

- Segregation means physical isolation to prevent fire jumping.
- All cables associated with the unit shall be segregated from cables of other units.
- Interplant cables of station auxiliaries and unit critical drives shall be segregated in such a way that not more than half of the drives are lost in case of single incident of fire. Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.
- In switchyard, control cables of each bay shall be laid on separate racks/trays.

**4.7** Minimum number of spare cores required to be left for interconnection in control cables shall be as follows:

| No. of cores in cable | No. of spare cores |
|-----------------------|--------------------|
| 2C,3C                 | NIL                |
| 5C                    | 1                  |
| 7C-10C                | 2                  |
| 14C and above         | 3                  |

#### **4.8 Directly Buried Cables**

- Cable trenches shall be constructed for directly buried cables. Construction of cable trench for cables shall include excavation, preparation of sieved sand bedding, riddled soil cover, supply and installation of brick or concrete protective covers, back filling and compacting, supply and installation of route markers and joint markers. Laying of cables and providing protective covering shall be as per IS: 1255. Reference drawing for buried cables is included as a tender drawing and enclosed with this specification.
- RCC cable route and RCC joint markers shall be provided wherever required. The voltage grade of the higher voltage cables in route shall be engraved on the marker. Location of underground cable joints shall be indicated with cable marker with an additional inscription "Cable Joint". The marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change in direction. They shall be located on both sides of road crossings and drain crossings. Top of cable marker/joint marker shall be sloped to avoid accumulation of water/dust on marker.

**4.9** Cable tags shall be provided on all cables at each end (just before entering the equipment enclosure), on both sides of a wall or floor crossing, on each duct/conduit entry, and at every 20 meters in cable tray/trench runs. Cable tags shall also be provided inside the switchgear, motor control centers, control and relay panels etc. where a number of cables enter together through a gland plate. Cable tag shall be of rectangular shape for power



|             | <p>cables and control cables. Cable tag shall be of 2 mm thick aluminum with number punched on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280. Alternatively, the Contractor may also provide cable tags made of nylon, cable marking ties with cable number heat stamped on the cable tags.</p> <p><b>4.10</b> While crossing the floors, unarmoured cables shall be protected in conduits upto a height of 500 mm from floor level if not laid in tray.</p> <p><b>5. Cable Terminations &amp; Connections</b></p> <p>a) The termination and connection of cables shall be done strictly in accordance with cable termination kit manufacturer" instructions, drawings and/or as directed by Project Manager. Cable jointer shall be qualified to carryout satisfactory cable jointing/termination. Contractor shall furnish for review documentary evidence/experience reports of the jointers to be deployed at site.</p> <p>b) Work shall include all clamps, fittings etc. and clamping, fitting, fixing, plumbing, soldering, drilling, cutting, taping, preparation of cable end, crimping of lug, insulated sleeving over control cable lugs, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job to the satisfaction of the Project Manager.</p> <p>c) The equipment will be generally provided with undrilled gland plates for cables/conduit entry. The Contractor shall be responsible for punching of gland plates, painting and touching up. Holes shall not be made by gas cutting. The holes shall be true in shape. All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively sealed by 2mm thick aluminium sheets.</p> <p>d) Control cable cores entering control panel/switchgear/MCC/miscellaneous panels shall be neatly bunched, clamped and tied with self-locking type nylon cable ties with de interlocking facility to keep them in position.</p> <p>e) All the cores of the control cable to be terminated shall have identification by providing ferrules at either end of the core, each ferrule shall be indelible, printed single tube ferrule and shall include the complete wire number and TB number as per the drawings. The ferrule shall fit tightly on the core. Spare cores shall have similar ferrules with suffix sp1, sp2, -etc. along with cable numbers and coiled up after end sealing. Supply of ferrules is in Vendor's scope.</p> <p>f) All cable terminations shall be appropriately tightened to ensure secure and reliable connections.</p> <p><b>Cable Sealing:</b></p> <p>Vendor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All opening in floor/roof/wall/cable tunnel/cable tranches made for conduit installation shall be sealed and made water proof by the vendor with modular multi dimensional cable system consisting of frames, blocks, compression wedge and its accessories. The cable sealing system shall have been tested for fire insulation for minimum 2 hrs as per BS 476/UL 1479/EN 1364 and shall provide water sealing for continuous pressure of 0.3 bars the system shall be rodent proof and shall have valid enclosure protection as per IEC 60529.</p> |   |                   |  |                                                                                                                                                                                                                                            |
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| <b>5.44</b> | <p><b>Pre-commissioning inspections/ checks/tests, MRT tests, coordination/liaison with state/ central departments/ CEIG/ GEDA/ GUVNL etc. for necessary approvals/clearances for commissioning, synchronization with grid/ plant commissioning</b></p> <table border="1"> <thead> <tr> <th>#</th><th>Scope description</th></tr> </thead> <tbody> <tr> <td></td><td>Vendor shall be responsible for carrying out following minimum tests/ checks for all the electrical equipment and any other tests as per requirements of GSECL/ concerned state/ central departments/ TRANSCO/ CEIG/ CEA/ GEDA/ GUVNL etc.</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | # | Scope description |  | Vendor shall be responsible for carrying out following minimum tests/ checks for all the electrical equipment and any other tests as per requirements of GSECL/ concerned state/ central departments/ TRANSCO/ CEIG/ CEA/ GEDA/ GUVNL etc. |
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|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| 1 | Pre-commissioning inspections / checks / tests, MRT tests and coordination / liaison activities with state / central departments / Transco/ DISCOM/ CEIG/ CEA/GEDA/ GUVNL etc. for necessary approvals / clearances for commissioning, synchronization with grid and post-commissioning operation of the plant. (Clearances shall include obtaining prior approvals for all applicable drawings/ documents etc. from concerned state / central departments / Transco/ DISCOM/ CEIG/ CEA/ GEDA/ GUVNL etc.) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|   | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Basic checks                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|   | A1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Tightness checks:                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1) Terminations of AC/DC power cables at SCBs, PCUs, Inverter transformers, Aux transformer, ACDB panel, UPS, FCBC, Battery banks, Aux AC/DC DB boards, ABT metering panel, 33kV VCB panels, SCADA panels etc.                                                                                                                                                                                                                                                                          |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2) Terminations of Control/ Instrumentation/ Data/ Communication cables wherever applicable.                                                                                                                                                                                                                                                                                                                                                                                            |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3) Terminations of earthing at all electrical equipment/ panels of inverter stations, pooling stations and control room/ substation bay                                                                                                                                                                                                                                                                                                                                                 |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4) Terminations of earthing of inverter transformers, aux transformer                                                                                                                                                                                                                                                                                                                                                                                                                   |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5) Terminations of earth chambers of vendor scope.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Note:</b> For M10 and above, torque wrench settings shall be followed for reference.                                                                                                                                                                                                                                                                                                                                                                                                 |
|   | A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Electrical continuity checks                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|   | A3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Megger (5kV) checks for all HT (33kV) cables and Line                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|   | A4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Hi-pot testing for all HT (33kV) cables prior to connection to the panels/ transformers.                                                                                                                                                                                                                                                                                                                                                                                                |
|   | A5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Megger (1kV) checks for all 1.1kV grade cables                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|   | A6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AC/DC supply checks at TBs of all electrical panels/ DBs/ Transformers.                                                                                                                                                                                                                                                                                                                                                                                                                 |
|   | A7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Transmission line/ Evacuation cable testing                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| B | Pre-commissioning electrical tests:                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|   | B1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Power conditioning units (with the support of PCU service engineer)                                                                                                                                                                                                                                                                                                                                                                                                                     |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1) DC side open circuit voltage and verification with SCB side measurements                                                                                                                                                                                                                                                                                                                                                                                                             |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2) Vendor to provide technician support to PCU service engineer for all other pre-commissioning tests as per OEM checklist                                                                                                                                                                                                                                                                                                                                                              |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3) Functioning of duct fans (operation, direction of rotation)                                                                                                                                                                                                                                                                                                                                                                                                                          |
|   | B2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Inverter transformers and Aux transformer                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1) Oil filtration: Equipment of adequate evacuation/ heating/ oil circulation capacity shall be deployed at site for this purpose. Filtration shall be carried out adequately in order to achieve the BDV and ppm within the limits as per relevant standards and as measured by NABL accredited laboratory. The machine shall have built-in BDV measuring set up for in-situ checking of BDV during filtration process. DG if required for oil filtration shall be arranged by vendor. |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2) IR tests LV-HV, HV-E, LV-E                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3) Vector group                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4) Voltage ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5) Magnetizing current                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 6) Magnetic balance                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7) Winding resistance at all taps                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
|--|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |     | 8) Fault simulation checks (at VCB breaker panels): Buchholz, OTI, WTI, PRV, LOLA etc<br>9) Alarm, trip settings (S1, S2) for WTI, OTI<br>10) Oil level at conservator (to be topped up, if required)                                                                                                                                                                                                                                                                                                                                                         |  |
|  | B3  | CTs 33kV at plant and substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  |     | 1) IR tests (all cores): Pri-Sec, Sec-Sec, Pri-E, Sec-E<br>2) Ratio tests / primary injection                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|  | B4  | PTs 33kV at plant and substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  |     | 1) IR tests (all cores): Pri-Sec, Sec-Sec, Pri-E, Sec-E<br>2) Voltage ratio test<br>3) Polarity test                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|  | B5  | 33KV breakers at plant and substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|  |     | 1. IR tests<br>2. Contact resistance measurement (CRM)<br>3. Timing test: close/ open/ close-open<br>4. Functional checks: breaker open/close, spring-charged motor<br>5. Remote operation from SCADA panels: open/close, command/ status, lamp indications                                                                                                                                                                                                                                                                                                   |  |
|  | B6  | Numerical relays at 33KV breaker/C&R panels at plant & substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|  |     | 1) Relay calibration using applicable kit/ software<br>2) IDMT, DT curves with timing/pickup settings in all relays based on gradation across from downstream to upstream taking into account settings at substation<br>3) Overcurrent, Earth fault pickup/ tripping time tests<br>4) Overvoltage, Undervoltage pickup and tripping time tests                                                                                                                                                                                                                |  |
|  | B7  | CT ratio / PT ratio to be set in meters/relays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|  |     | i. All MFM meters<br>ii. ABT meters<br>iii. Protection relays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|  | B8  | ACB breaker settings (with the help of PCU service engineer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|  |     | 1) Over load, Short time fault, ground fault                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|  | B9  | Earth resistance measurements for all chambers of vendor scope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|  |     | 1) With electrode connected to grid<br>2) Without connecting electrode to grid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|  | B10 | UPS/ FCBC charger/ Battery banks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  |     | All functional checks: battery charging/ discharging, FCBC/ battery output parameters etc. as per OEM checklists                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  | B11 | 33KV Single core to three core cable conversion panel tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|  | C   | Testing agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|  |     | Credentials of testing agency along with calibration certificates of testing equipment shall be submitted to BHEL for approval prior to awarding of work.                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|  | D   | Coordination and Liaison activities to be carried out by vendor:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|  |     | 1) Vendor shall lead in the process of obtaining approval from Transco/ DISCOM/ CEIG/ CEA/ GEDA/ GUVNL etc. as applicable for line charging/ grid synchronization/ plant commissioning.<br>2) Liaison responsibility for getting the approvals rests with the vendor. Wherever technical clarifications are required by the approving agencies with regard to SPV portions (including solar array) up to metering yard, transmission line and substation bay, vendor shall suitably coordinate/liaison with the concerned state/central approving agencies to |  |

|      |                                                                                                                                                                                                                                                                                                                                                                      |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                                                                                                                                                                                                                                                                                                                                                      |   | <p>make the approval process successful. Accordingly, vendor shall participate in direct discussions with the approving agency whenever necessary. Also, all the necessary payments/ expenditures to be incurred with ref to such coordination/ liaison in this regard shall be borne by the vendor.</p> <p>3) Following are the areas of approval, as applicable</p> <p>(a) GTP/ datasheets/ GA drawings/ Bill of materials, MQP etc. of all (BHEL's/vendor's) supply items.</p> <p>(b) Site test reports of transformers, transformer oil, VCB breakers, CTs, PTs, LAs, resistance of earth mat grids etc.</p> <p>(c) Interaction with supervising/ inspection agency such as MRT departments, Transco, CEIG, CEA, GEDA/ GUVNL etc, as applicable, for applying to them/ inviting them for supervision/ inspection at site.</p> <p>(d) Interaction/ coordination with customer in the above process as and when required.</p> <p>(e) All necessary testing kits/ instruments shall be arranged as per the requirements of inspection agency. Basic instruments such as digital multimeter, 5kV digital megger with PI feature, earth resistance meter, VCB open/close timing test kit, clamp meters etc. shall be organized at site at the time of inspection. Competent electrical technician shall also be made available at the site.</p> <p>(f) Subsequent to site inspection by the concerned agency, vendor shall obtain the clearance for grid synchronization after implementation of all the observations of CEIG.</p> <p>(g) Vendor shall also coordinate with DISCOM for obtaining approvals such as grid connectivity approval etc.</p> <p><b>(h) Vendor shall coordinate and liason with GEDA for registration of project, inspection, approval for declaration of COD of the project. Payment of GEDA registration charges of Rs. 28000/- per MW shall be in vendor scope.</b></p> |
|      |                                                                                                                                                                                                                                                                                                                                                                      | E | Commissioning of Substation bay equipment, Transmission line and Solar Power Plant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|      |                                                                                                                                                                                                                                                                                                                                                                      |   | <p>1) Vendor shall organize all necessary tools/ measuring instruments required to operate the various electrical equipment at the time of commissioning: Digital megger 5KV with PI feature, Earth resistance tester, Phase sequence meter, Clamp meters etc., discharge rods, PPE safety gadgets (helmets, shoes etc.).</p> <p>2) It is the responsibility of the vendor to successful charge 33kV transmission line followed by charging of 33kV yard at SPV plant end and grid synchronization of inverters/ plant commissioning for full DC capacity.</p> <p>3) Vendor shall participate actively in the commissioning and establish that there is successful export of power from all the strings PCUs and through the 33kV transmission line/ switchyards/ substation bay.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|      |                                                                                                                                                                                                                                                                                                                                                                      | F | After commissioning and completion of all works including clearing of all punch points, trail run of the plant will be commenced for 7 consecutive days based on acceptance by GSECL. Immediately after trial Performance Guarantee test shall start for a period of 30 days. During trial run and PG test vendor shall deploy manpower, operate and maintain the plant and ensure that there are no breakdowns in any equipment, all required tools and spares are available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 5.45 | <p><b>Spares required to be supplied along with main consignment:</b></p> <p>1) MC4 connectors: 350 sets (1 set = 2 Nos)</p> <p>2) Y-connectors: 350 sets (1 set = 2 Nos)</p> <p>3) Fuses of all types: 1% of each type and rating</p> <p>4) MCB of all types: 1% of each type and rating</p> <p>5) Indicating lamp set of all types: 1% of each type and rating</p> |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



**PURCHASE SPECIFICATION; GROUP: PHOTOVOLTAICS  
SUPPLY OF BOS ITEMS AND I&C FOR 100MW(AC)  
PHASE-2 SOLAR PV PROJECT AT RAGHANESDA ULTRA  
MEGA SOLAR PARK, GUJARAT**

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| 6)                                                                                                                                  | Surge protection devices: 1% of each type and rating            |
| 7)                                                                                                                                  | LED lights: 1% of each type and rating                          |
| 8)                                                                                                                                  | 33KV, 1C, 185 sq.mm (E) indoor End termination kits- 15 Nos     |
| 9)                                                                                                                                  | 33KV, 1C, 185 sq.mm (E) Straight through jointing kits- 10 Nos  |
| 10)                                                                                                                                 | 33KV, 1C, 500 sq.mm (E) indoor End termination kits- 6 Nos      |
| 11)                                                                                                                                 | 33KV, 1C, 500 sq.mm (E) Straight through jointing kits- 6 Nos   |
| 12)                                                                                                                                 | 33KV, 3C, 500 sq.mm (E) indoor End termination kits- 3 Nos      |
| 13)                                                                                                                                 | 33KV, 3C, 500 sq.mm (E) End termination kits for AIS/GIS- 3 Nos |
| 14)                                                                                                                                 | 33KV, 3C, 500 sq.mm (E) Straight through jointing kits- 3 Nos   |
| 15)                                                                                                                                 | CCTV camera: 1 No. each type                                    |
| 16)                                                                                                                                 | Fire alarm system sensors/ MCP: 1 No. each type                 |
| 17)                                                                                                                                 | Earthing electrodes: 2% each type                               |
| <p>Notes:<br/>In case quantity arrived based on percentage is a decimal figure, it shall be rounded off to next higher integer.</p> |                                                                 |

**6.0 General conditions applicable during supply, installation, commissioning**

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.1  | As already mentioned in previous clauses, vendor shall organize power supply on their own. Accordingly, DG sets of suitable capacity shall be deployed by the vendor for construction works.                                                                                                                                                                                                                                                                                                                                                                                |
| 6.2  | Similarly, water required for construction works shall be organized by vendor (tankers etc.).                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6.3  | All machinery such as cranes, hydra, JCBs, forklifts, transport trucks, trolleys etc. necessary for movement and installation of materials / panels / equipment etc. shall be organized by the vendor.                                                                                                                                                                                                                                                                                                                                                                      |
| 6.4  | All necessary tools and tackles such as crimping tool (including heavy duty tools for crimping copper/ aluminium cables up to 630 sq-mm), screw driver set, power screw drivers, cutting pliers, nose pliers, spanner sets, adjustable spanners, hole-saw cutter set, bending tools, torque wrenches, hack saw blades, pipe wrenches, flat / round files, HV termination tools, drilling machines, welding machines, concrete mixers, steel bar bending tools / templates/ shuttering materials for RCC works, spade, shovel, hammer etc. shall be organized by the vendor. |
| 6.5  | All necessary measuring instruments such as digital multimeters, measuring tapes, vernier calipers, electrical testers, digital meggers (1kV, 2.5kV, 5kV), earth resistance meters, clamp meters, transformer oil BDV kit, relay testing kit (secondary injection), primary injection kit, infrared thermal imaging handheld temperature meter etc. All these instruments shall possess valid calibration certificate issued from approved NABL laboratory.                                                                                                                 |
| 6.6  | Vendor shall make their own arrangements for necessary food, drinking water and accommodation for their labour and employees posted at the site. Similarly, food and drinking water required at the site, during the construction operations, shall also be in scope of vendor.                                                                                                                                                                                                                                                                                             |
| 6.7  | <b>65% of the jobs that will be created due to the projected in the supervisory and managerial cadres and 80% of the jobs that will be created in other cadres due to the project shall be filled in by employing the local persons. The expression "local person" shall mean a person domicile in Gujarat state for a minimum period of 15 years prior to applying for employment to the Contractor.</b>                                                                                                                                                                   |
| 6.8  | Vendor shall organize all necessary steps to meet statutory requirements such as labour license, PF, ESI etc. and also ensure compliance with relevant acts such as minimum wages act, income tax act, employee insurance act etc. for their labour deployed at site.                                                                                                                                                                                                                                                                                                       |
| 6.9  | Vendor shall maintain updated labour register, with name, age, qualification, salary, attendance details etc. at the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6.10 | Vendor shall adhere to all necessary safety norms such as use of helmet, goggles, hand gloves, gumboots, aprons etc. It is the ultimate responsibility of the vendor in all respect to prevent accidents at the site and safeguard their labour from accidents.                                                                                                                                                                                                                                                                                                             |
| 6.11 | Vendor shall use danger boards, wherever required, to ensure safety of the persons during the work at site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



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| 6.12 | Vendor shall, at the completion of every work, clear off the debris, which resulted out of the work. In case of excavation work such as cable trench etc., vendor shall finish the land neatly with necessary leveling, rolling etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.13 | Vendor shall carry out the work without causing inconvenience to other contract groups at the site. In case of conflicts with other groups, vendor shall ensure that the matter is resolved at once amicably so that the progress of work is not affected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 6.14 | Any damages on the building, structures etc. attributable to the acts of labour/ employees of vendor shall be rectified and made good by the vendor at their own cost.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 6.15 | No child labour shall be employed for execution of the present contract.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 6.16 | Any miscellaneous materials, which are found essential for technical completion of the contract but not mentioned explicitly in this specification, shall be deemed to be included in the specification. Accordingly, such materials shall be included by the vendor as part of the offer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 6.17 | Special instruction for earthing:<br>In compliance with Rule 33 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode. Accordingly, all cases such as cable support structures, cable ladders, cable trays (control room) etc. shall be earthed.                                                                                                                                                                                                                                                                                                                                                                              |
| 6.18 | BHEL/GSECL shall witness routine/ acceptance/ type tests performed at manufacturer works for the items supplied by vendor. Vendor shall accordingly provide inspection call to BHEL with submission of quality assurance plan in advance.<br>For the items bought out from dealers, test certificates, as per relevant IS / IEC standards, as issued by manufacturer shall be submitted to BHEL. However, prior approval shall be obtained from BHEL/GSECL for procurement of the item from dealers.                                                                                                                                                                                                                                                                                       |
| 6.19 | Field Quality Plan / Quality control system (if applicable)<br>Vendor shall set up a field quality control laboratory with full set up to facilitate testing of all construction materials in accordance with FQP (Field quality control plan) as approved by BHEL/GSECL. Vendor shall deploy a well experienced quality control engineer to monitor all QC activities at site as per approved FQP.<br>Specifically, with reference to civil works, vendor shall submit all concrete mix designs and bituminous mix designs for BHEL/GSECL approval before starting of the work. All the third party testing should be conducted in NABL approved laboratories only. Vendor shall submit the FQP for the civil construction works before starting of the works for approval of BHEL/GSECL. |
| 6.20 | Any deviations shall be discussed with BHEL site engineers and implementation shall be taken up only after approval from BHEL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6.21 | Vendor shall submit periodic status report, on daily as well as weekly consolidated basis, to BHEL on the progress of the contract.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 6.22 | Vendor shall, as and when required by BHEL/GSECL, participate in the review meetings conducted by BHEL/GSECL at project site, BHEL-SBD (Bangalore), BHEL-Corporate office (New Delhi), GSECL office etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 6.23 | <b>General Guidelines</b><br>a) Any civil or electrical work which is not mentioned or included in this tender document but necessary for functional requirements of the plant shall be carried out by vendor.<br>b) Vendor shall prepare all designs / drawings based on the specifications given in the tender and in light of relevant BIS/IS/ equivalent standard.<br>c) Vendor shall provide type test reports and datasheet/ GTP for all equipment covered under vendor scope of supply.<br>d) BHEL reserves right to modify the design at any stage to meet local site conditions / project requirements.<br>e) All work shall be carried out in accordance with the latest edition of the Indian Electricity Act and rules formed thereunder and as amended from time to time.     |
| 6.24 | For all current carrying parts and earthing, S.S hardware shall be provided and all other places, G.I hardware shall be provided. M.S hardware shall not be used in any place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6.25 | All the galvanized metal parts shall have min. 80 microns thickness of galvanization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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## 7.0 Documents to be submitted for BHEL approval during detailed engineering

Vendor shall submit following documents for BHEL/GSECL approval, which shall be submitted to BHEL in phased manner based on priority sequence of activities during detailed engineering (after receipt of purchase order from BHEL)

|     |                                                                                                                                                                |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1 | Name of vendor/ make, model number/ part number, specification/ sizes/ dimensions/ drawings/ datasheets shall be submitted for all the vendor supplied items.  |
| 7.2 | Design calculations/ general arrangement drawings/ single line diagrams/ GTP particulars/ datasheets/ schemes/ layouts/ bill of materials etc., as applicable. |
| 7.3 | Manufacturing Quality Plans for all the vendor supplied items                                                                                                  |
| 7.4 | Field quality plan for the field work: civil works, electrical works                                                                                           |
| 7.5 | Detailed activity-time chart for project implementation                                                                                                        |
| 7.6 | Detailed manpower deployment schedule                                                                                                                          |

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REF. DRG.NO.

SIGN & DATE

INVENTORY NO.

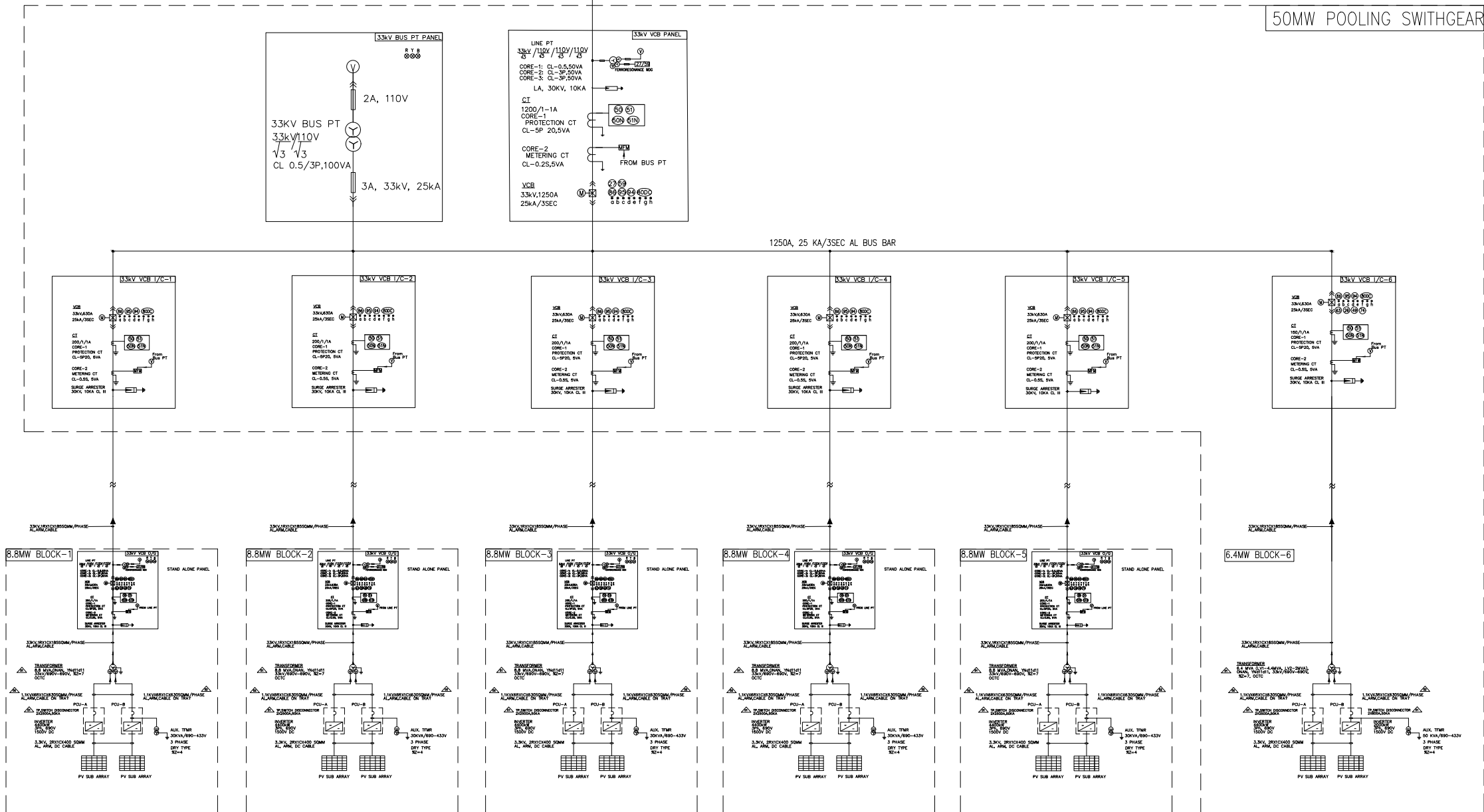
A  
B  
C  
D  
E  
F

FEEDER NO:1 AT GPCL SUBSTATION  
(0.5KMS AWAY FROM SOLAR PLANT)

33 kV, 3Cx3RX500sqmm  
XLPE ARMORED AL(E) UG CABLE  
WITH ONE RUN OF SPARE CABLE

SINGLE CORE TO THREE CORE  
CONVERSION PANEL NEAR  
SUBSTATION

33 kV, 1Cx3R/PhaseX500sqmm  
XLPE ARMORED AL(E) UG CABLE  
WITH ONE RUN OF SPARE CABLE



NOTE:

- \* THERE WILL BE IDENTICAL TWO BLOCKS OF 50MW POOLING STATION FOR 100MW SOLAR PLANT
- \* ALL POWER CABLE SHALL BE XLPE INSULATED.
- \* CABLE SIZING AND AUXILIARY TRANSFORMER SIZING SHALL BE SUBMITTED SEPARATELY FOR APPROVAL.

| REV. | DATE | ALTERED<br>CHECKED | REV. | DATE | ALTERED<br>CHECKED | REV. | DATE | ALTERED<br>CHECKED | REV. | DATE | ALTERED<br>CHECKED |
|------|------|--------------------|------|------|--------------------|------|------|--------------------|------|------|--------------------|
|      |      | APPROVED           |      |      | APPROVED           |      |      | APPROVED           |      |      | APPROVED           |

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DRAWING REVISED TO INCORPORATE  
CUSTOMER COMMENTS DT 16.10.2020.

DRAWING REVISED TO INCORPORATE  
CUSTOMER COMMENTS DT 03.10.2020.

NAME OF PROJECT: 100MW (2X50) SOLAR POWER PLANT AT  
RAGHANESDA PHASE-2

NAME OF CUSTOMER: GSECL

| DRN  | NAME | SIGN. | DATE     | No.OF<br>VAR |
|------|------|-------|----------|--------------|
|      |      |       |          |              |
| CKD  | LNK  | -SD-  | 24-09-20 |              |
| APPD | PRV  | -SD-  | 24-09-20 |              |
| APPD | SNB  | -SD-  | 24-09-20 |              |

| DEPT.         | SCALE | WEIGHT(Kg) | REF. TO ASSY. DRG. | ITEM NO. | No.OF<br>ITEM |
|---------------|-------|------------|--------------------|----------|---------------|
| SC&PV<br>CODE |       |            |                    |          |               |

| TITLE                  | DRAWING NO.                  | REV. |
|------------------------|------------------------------|------|
| AC SINGLE LINE DIAGRAM | BHEL-GSECL-R2-ELEC-ACSLD-001 | 02   |

| SHEET NO. 01 | NO. OF SHEETS : 01 |
|--------------|--------------------|
|--------------|--------------------|

E 728003.982  
N 2716363.381

PLOT-A  
128 (GPCL)  
A -100 MW  
19,00,396.65 Sq.Mt.

NUMBER OF TABLES: 1120

|                  |       |
|------------------|-------|
| OFC CABLE LENGTH | _____ |
| HT CABLE LENGTH  | _____ |

|       |      |      |      |
|-------|------|------|------|
|       | NAME | SIGN | DATE |
| DRAWN |      |      |      |

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| CHECKED                |  |  |  |
| APPROVED               |  |  |  |
| DISTRIBUTION OF PRINTS |  |  |  |



| DEPT. | CODE |
|-------|------|
|-------|------|

|                                                                                       |                                                                                       |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SC&PV                                                                                 | 439                                                                                   |
|  |  |

PROJECT :  **GUJARAT POWER CORPORATION LIMITED**  
Village: Ragho Nesda, Taluka: Vav, District: Bhamkantha

TITLE: TENTATIVE ARRAY LAYOUT  
100MW RAGHANESDA PHASE 2

|               |  |
|---------------|--|
| BHEL DRG. No. |  |
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|               |    |
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| No. OF SHEETS | 01 |
| SHEET No.     | 01 |



ಭಾರತ್ ಹವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್  
भारत हेवी इलेक्ट्रिकल्स लिमिटेड



**Bharat Heavy Electricals Limited**

(A Government of India Undertaking)

**ELECTRONICS DIVISION**

P. B. No. 2606, Mysore Road, Bengaluru - 560 026

SCPV: BOS: ITB-Rev 05

**INSTRUCTIONS TO BIDDERS**

**Bidder is requested to read the instructions carefully and submit their quotation taking into consideration of all the points:**

**A. GENERAL INSTRUCTIONS:**

1. Any Purchase Order resulting from this enquiry shall be governed by the Instructions to Bidders (document reference: SCPV:BOS:ITB-Rev 05), General Conditions of Contract (document reference: SCPV: BOS: GCC-Rev 04) and Special Conditions of Contract, if any, of the enquiry.
2. Any deviations from or additions to the "General Conditions of Contract" or "Special Conditions of Contract" require BHEL's express written consent. ***The general terms of business or sale of the Bidder shall not apply to this tender.***
3. Bidders (Also includes Term Suppliers / Contractors, wherever used in this document) are instructed to Quote their most competitive price and best delivery etc. in the Offer. Prices should be indicated in both figures & words (Please also refer Section-12, under Section-B).
4. Regret letter (either through post or by mail or by EPS) indicating reasons for not quoting must be submitted without fail, in case of non-participation in this tender. Supplier shall be liable for removal as a registered vendor of BHEL when the supplier fails to quote against four consecutive tender enquiries for the same item or all enquiries in last two years for the same item, whichever is earlier.
5. Procurement directly from the manufacturers is preferred. However, if the OEM/ Principal insist on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. Agent/Representative authorized by the OEM/Principal in turn cannot further sub authorize any other firm for submitting the offer or for placement of order.

In case bids are received from the manufacturer/ supplier and his agent, bid received from the agent shall be ignored.

6. Consultant / firm (and any of its affiliates) shall not be eligible to participate in the tender/s for the related goods for the same project if they were engaged for consultancy services for the same project.
7. If an Indian representative/associate/liaison office quotes on behalf of a foreign based

bidder, such representative shall furnish the following documents:

- (a) Authorization letter to quote and negotiate on behalf of such foreign-based bidder. (Annexure- AF)
- (b) Undertaking from such foreign based bidder that such contract will be honored and executed according to agreed scope of supply and commercial terms and conditions.
- (c) Undertaking shall be furnished by the Indian representative stating that the co-ordination and smooth execution of the contract and settlement of shortages/damages/replacement/repair of imported scope till the Equipment/ System is commissioned and handed over to customer will be the sole responsibility of the Indian representative/associates/agent/liaison office.
- (d) Refer **Annexure I** on “Guidelines for Indian Agents”.
- (e) In case, The Principal manufacturer decides not to quote directly to BHEL and authorized his representative to quote, the format attached as per annexure duly signed and sealed by authorized signatory and the same shall be attached along with offer.

8. (A) In case it is specified in the SCC as the terms of delivery DDP (delivery duty paid) , FOR destination to site, door delivery at site which means material cost, insurance, customs duty, safe guard duty (SGD) or any other taxes, duties, levies etc air freight sea freight customs handling charges inland transport from port to destination to vendor account.

(B) In case of imported scope of supply, (Not Covered in clause 8 A) customs clearance & customs duty payment will be to BHEL account after the consignment is received at Indian Airport /Seaport. Bidders must provide all original documents required for completing the customs clearance along with the shipment. Warehousing charges due to incomplete or missing documentation will be to supplier's account. All offers for imported scope of supply by air, must be made from any of the gateway ports (within the country) indicated (Refer Annexure II).

9. The offers of the bidders who are on the banned list and also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of the banned firms is available on BHEL website: [http://www.bhel.com/vender\\_registration/vender.php](http://www.bhel.com/vender_registration/vender.php)
10. Business dealings with bidders will be suspended if they are found to have indulged in any malpractices/misconduct which are contrary to business ethics like bribery, corruption, fraud, pilferage, cartel formation, submission of fake/false/forged documents, certificates, information to BHEL or if they tamper with tendering procedure affecting the ordering process or fail to execute a contract, or rejection of 3 consecutive supplies or if their firms / works are under strike/lockout for a long period. Bidder may refer “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” available on [www.bhel.com](http://www.bhel.com) for more details.
11. The bidder along with its associate/collaborators/sub-contractors/sub-vendors/consultants/service providers shall strictly adhere to BHEL Fraud Prevention

Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to your notice.

12. Offers to be submitted in English Language only.
13. For this procurement, the local content to categorize a supplier as a Class-I local supplier/ Class-II local supplier/ Non-local supplier and purchase preference to Class-I local supplier, is as defined in Public procurement (Preference to Make in India), Order 2017 dated **16.09.2020** issued by DPIIT. In case of subsequent Orders issued by the Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of price bid/s against this NIT.

Any Indian Bidder intending to avail the benefits shall submit the requisite documents as per the aforesaid orders. The self declaration for Make in India or CA certificate for Make in India as per Annexure S/CA to be attached with the offer.

14. The Bidder shall mandatorily submit Declaration as mentioned below, under Rule 144(xi) of General Financial Rules, 2017 amendment dt 23.07.2020 issued by Ministry of Finance, Govt. of India. The declaration to be submitted on Company Letter head duly signed and sealed by authorised signatory, for ascertaining the eligibility of offer in the tender.

“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered.”

(Where applicable, evidence of valid registration by the Competent Authority shall be attached).

The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

Refer Annexure-X for ‘Restrictions under Rule 144(Xi) of General Financial Rules, 2017 amendment dt: 23.07.2020’.

## **B. GUIDELINES FOR PREPARATION OF OFFER:**

1. Quotation shall be submitted in Single Part Bid, Two Part Bid or Three Part Bid, as called for in the tender:
  - **SINGLE PART BID:** Technical and Commercial Bid with prices along with price summary & filled in BHEL Standard Commercial terms and conditions in a single sealed envelope.
  - **TWO PART BID:** Unpriced offer i.e. “Techno-commercial Bid” with filled in BHEL Standard Commercial terms and conditions in a sealed envelope **along with the copy of the “Price Bid” without the prices** should be enclosed in one cover and the cover must be super scribed **“Techno-commercial offer)** and Priced offer i.e.

“Price Bid” containing price summary in a separate sealed envelope and must be super scribed **“Price Bid”**. Both these envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.

- **THREE PART BID:** Pre-qualification Bid (Part-I), Techno Commercial Bid with filled in BHEL Standard Commercial terms and conditions (Part-II), and Price Bid (Part-III). All three envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.

If any of the offers (Part I, Part II or Part III) are not submitted before the due date and time of submission (or) if any part of the offer is incomplete, the entire offer of the bidder will be rejected.

2. Supplier shall ensure to superscribe each envelope with RFQ number, RFQ Date, RFQ Due date and time, Item Description and Project clearly & boldly. Also mention on the envelope whether it is “Techno Commercial Bid” or “Price Bid” or “Pre-Qualification Bid”. Please ensure complete address, department name and purchase executive name is mentioned on the envelope (before dropping in the tender box or handing over) so that the tender is available in time for bid opening.
3. BHEL standard Commercial Terms and Conditions (duly filled, signed & stamped) must accompany Technical-Commercial offer without fail and should be submitted in original only.

The above indicated submission of Offers in “sealed envelope/hard copy” as mentioned in points B.1-B.3 is applicable for tenders that are not floated through E-Procurement System (EPS).

4. Validity: Unless otherwise specified in SCC (special commercial conditions of contract), the offer will be valid for a period of 90 days from the date of part-I bid opening and in case of Negotiation/Counter-offer/Reverse Auction, price validity will apply afresh for a period of 60 days from the date of according final price by bidder (or) upto original validity period, whichever is later.
5. Any of the terms and conditions not acceptable to supplier, shall be explicitly mentioned in the Techno-Commercial Bid. If no deviations are brought out in the offer it will be treated as if all terms and conditions of this enquiry are accepted by the supplier without deviation.
6. Deviation to this specification/item description, if any, shall be brought out clearly indicating “DEVIATION TO BHEL SPECIFICATION” without fail, as a part of Techno-Commercial Bid. If no deviations are brought out in the offer it will be treated as if the entire specification of this enquiry is accepted without deviation.
7. Suppliers shall submit one set of original catalogue, datasheets, bill of materials,

dimensional drawings, mounting details and/or any other relevant documents called in purchase specification as part of Technical Bid. Approximate Packing dimension to be indicated in offer\_(L)\_ft x\_(B)\_\_\_ft x\_(H)\_ft, in case of ODC Load. Consignment beyond the dimension\_(L)40\_ft x\_(B)8\_ft x\_(H)8\_ft to be indicated in Offer.

8. "Price Bid" shall be complete in all respects containing price break-up of all components along with all applicable taxes and duties, Packing and forwarding charges, freight charges (if applicable) etc. Once submitted, **NO** modification / addition / deletion will be allowed in the "Price Bid." Bidders are advised to thoroughly check the unit price, total price to avoid any discrepancy.
9. In addition, bidder shall also quote for erection & commissioning charges/erection supervision & commissioning charges (E&C service charges), documentation charges, testing Charges (type & routine), training charges etc. as applicable along with corresponding tax. The price summary must indicate all the elements clearly.
10. Wherever applicable, bidders should indicate "Lumpsum" Erection and Commissioning (or) Erection Supervision and Commissioning charges, as applicable (including To & Fro Fare, Boarding, Lodging, Local Conveyance etc.) for carrying out E&C activity and further handing over to customer. The quotation shall clearly indicate scope of work, likely duration of commissioning, pre-commissioning checklist (if any).
11. Wherever bidders require PAC (Project Authority Certificate)/applicable certificates for import of raw materials, components required for MNRE, DECC, EPCG Power Projects, Export Projects or other similar projects wherein supplies are eligible for customs duty benefits, lists and quantities of such items and their values (CIF) has to be mentioned in the offer. Prices must be quoted taking into account of such benefits.
12. Prices should be indicated in both figures & words. Bid should be free from correction/overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid will be rejected. Any typographical error, totalling mistakes, currency mistake, multiplication mistake, summing mistakes etc. observed in the price bids will be evaluated as per **Annexure III** "Guidelines for dealing with Discrepancy in Words & Figures – quoted in price bid" and BHEL decision will be final.
13. Documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. However, scanned copy to be attached in E-Procurement System (EPS).

#### **C. GUIDELINES FOR OFFER SUBMISSION:**

The under-mentioned clauses 1, 2 & 3 will not be applicable for EPS tenders.

1. Offers / Quotations must be dropped in tender box before 13.00 Hrs. on or before due date mentioned in RFQ. The offers are to be dropped in the proper slot of the Tender Box kept in our reception area with caption "CE, SC&PV, DEFENCE". Tenders

are opened on 3 days in a week (Monday/Wednesday/Friday). Tender must be deposited in the slot corresponding to the day (Monday - Box no.4/Wednesday - Box no. 6 /Friday - Box no.8) while depositing the offer.

2. E-Mail/ Internet/EDI offers received in time shall be considered only when such offers are complete in all respects. In case of offers received through E-mail, please send the offer to the email ID specified in the SCC document of the tender.
3. Offers of Vendors who already have a valid Technical/Commercial MOU with BHEL-EDN for the items of the RFQ shall mention the relevant MOU reference no. and give only such other details not covered in the MOU.
4. In cases where tender documents are bulky, or due to some reasons tender documents are required to be submitted by hand or through posts/couriers, the offers are to be handed over either of the two purchase officers whose names are mentioned in the SCC document of tender RFQ.
5. Tenders will be opened on due date, time and venue as indicated in the RFQ in the presence of bidders at the venue indicated in the RFQ. For EPS tenders, e-mail notifications will be automatically generated and forwarded to registered e-mail ID/s of bidders during opening of tenders.
6. Bidder will be solely responsible:
  - (a) For submission of offers before due date and time. Offers submitted after due date and time will be treated as "Late offers" and will be rejected.
  - (b) For submission of offers in the correct compartment of the tender box based on the day of due date (Monday/Wednesday/Friday). Please check before dropping your offer in the correct tender box.
  - (c) For depositing offers in proper sealed condition in the tender box. If the bidder drops the tender in the wrong tender box (or) if the tender document is handed over to the wrong person, BHEL will not be responsible for any such delays.
  - (d) For offers received through email etc., suppliers are fully responsible for lack of secrecy on information and ensuring timely receipt of such offers in the tender box before due date & time (This clause will not be applicable for EPS tenders).

The above indicated submission of Offers as mentioned in points 6(a) to 6(d) is applicable for tenders that are not floated through EPS.

- (e) In case of e-tender, all required documents should be uploaded before due date and time. Availability of power, internet connections, system/software requirements etc. will be the sole responsibility of the bidder. Wherever assistance is needed for submission of e-tenders, help-line numbers as available in the web-site of service provider of BHEL may be contacted.

**Purchase Executive/ BHEL shall not be responsible for any of the activities relating to submission of offer.**

#### **D. PROCESSING OF OFFERS RECEIVED:**

1. Any discount/ revised offer submitted by the supplier on its own shall be accepted provided it is received on or before the due date and time of offer submission (i.e.

Part-I bid). The discount shall be applied on pro-rata basis to all items unless specified otherwise by the bidder.

2. Changes in offers or Revised offers given after Part-I bid opening shall not be considered as a part of the original offer unless such changes/revisions are requested by BHEL. In case of withdrawal of any Technical/Commercial deviation(s) by the bidder before opening of price bids/conducting the Reverse Auction, revision of price/impact bid will not be accepted.
3. In case there is no change in the technical scope and/ or specifications and/ or commercial terms & conditions, the supplier will not be allowed to change any of their bids after Technical bids are opened (after the due date and time of tender opening).
4. In case of changes in scope and/ or technical specifications and/ or commercial terms & conditions by BHEL and it accounts for price implications from bidders, all techno-commercially acceptable bidders shall be asked by BHEL (after freezing the scope, technical specifications and commercial terms & conditions) to submit the impact of such changes on their price bid. Impact price will be applicable only for changes in technical specification / commercial conditions by BHEL. The impact price must be submitted on or before the cut-off date specified by BHEL and the original price bid and the price impact bid will be opened together at the time of price bid opening. Impact price means only for those which have been impacted by addition/deletion/changes in the technical specification or commercial conditions. The impact may be +/- incremental value of the currency in which originally quoted.
5. Un-opened bids (including price bids) will be returned to the respective bidders after release of Purchase order and order acknowledgement. Regarding Offers for EPS tenders that get rejected on PQC/ techno-commercial grounds, the bids for the subsequent parts will not be opened i.e., both technical bid and price bid (Parts-II & III) will not be opened in case of rejection on PQC ground and price bid (Part-II/Part-III, as applicable) will not be opened in case of rejection on techno-commercial ground.
6. After receipt of Purchase Order, supplier should submit required documents viz., specified drawings, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/Customer.
7. Any deviation to the terms and conditions not mentioned in the quotation by supplier in response to this enquiry will not be considered, if put forth subsequently or after issue of Purchase Order, unless clarification is sought for by BHEL and agreed upon in the Purchase Order.
8. Evaluation shall be on the basis of delivered cost (i.e. "Total Cost to BHEL"), as per RFQ terms.  
"Total Cost to BHEL" shall include total basic cost, packing & forwarding charges, taxes and/or duties (as applicable), freight charges, taxes on Services, customs clearance charges for imported items, any other cost indicated by bidder for

execution of the contract and loading factors (for non-compliance to BHEL Standard Commercial Terms & Conditions). Benefits arising out of Nil Import Duty on DEEC, EPCG, MNRE projects, DFIA Projects, Physical Exports or such 100% exemptions (statutory benefits), project imports, customer reimbursements of statutory duties (like Basic Customs Duty and cess on customs duty), Input tax credits as applicable will also be taken into account for arriving at the Total cost to BHEL (wherever applicable and as indicated in SCC document of tender).

For EPS tenders, it shall be noted that the prices (including discounts) vis-a-vis currency quoted in EPS portal only will be considered as Final for the purpose of evaluation of the lowest bidder. Bidder shall ensure to indicate the applicable taxes against each line item in online portal, failing to which the same will be considered as inclusive/NIL.

In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders. Incase more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s). Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

9. For evaluation of offers in foreign currency, the exchange rate (TT selling rate of SBI) shall be taken as under:

|                     |   |                            |
|---------------------|---|----------------------------|
| Single part bids    | : | Date of tender opening     |
| Two/three part bids | : | Date of Part-I bid opening |
| Reverse Auction     | : | Date of Part-I bid opening |

In case of Performance Bank Guarantee (PBG) also, exchange rate will be considered as mentioned above for converting foreign currency to Indian currency and vice versa.

If the relevant day happens to be a bank holiday, then the exchange rate as on the previous working day of the bank (SBI) shall be taken.

10. Ranking (L-1, L-2 etc.) shall be done only for the techno-commercially acceptable offers and on basis of Evaluation of Total Cost to BHEL.

#### **E. INFORMATION ON PAYMENT TERMS:**

1. All payments will be through Electronic Fund transfer (EFT). Vendor has to furnish necessary details as per BHEL standard format (**Refer Annexure IV**) for receiving all payments through NEFT.(Applicable for Indian vendors only).
2. In case of High Sea Sales transaction, customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors. All warehousing charges due to delay in submission of complete and or correct HSS documents to BHEL will be to supplier's account only. Such recovery will be made out of any of the available bills (**Refer Annexure V**).
3. Statutory deductions, if any, will be made and the deduction certificate shall be

issued.

A. In case vendor does not provide PAN details, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.

In addition to the above, Foreign vendors shall also submit relevant details of their bankers like Swift Code, Banker's Name & Address etc.

B. TDS deduction as per section 51 of CGST Act, 2017 shall be applicable as per Gazette Notification No. 50/2018-Central Tax, Dated: 13th September 2018 and subsequent notification/s, as and when released by Govt. authorities.

4. Incomplete documentation will not be accepted. Delayed submission of invoice / documents may result in corresponding delay in payment. In this connection, request to also refer clause: G about invoicing & payment formalities under GST regime. Applicable documents shall be submitted to the purchaser at the time of execution of supplies/services for availing GST input credits.

#### **F. STANDARD PAYMENT TERMS OF BHEL-EDN:**

| <b><u>PURCHASE<br/>ORDERS FOR:</u></b>   | <b><u>SUPPLY WITH SERVICE(S)</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b><u>SUPPLY ONLY</u></b>                                                                                                                                                                                                                                                                                    |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>INDIGENOUS<br/>PROCUREMENT</u></b> | <p>a. 80% of basic supply value+100% taxes and freight charges will be paid with 45 days credit from the receipt of material at site or 15 days credit from the date of submission of complete set of documentation whichever is later.</p> <p>b. 10% of basic supply value will be paid on completion of I&amp;C against submission of supplementary invoice with proof of completion of I&amp;C along with I&amp;C charges (if Any)</p> <p>c. Balance 10% (retention money) against submission of supplementary invoice along with PBG valid for Warranty Period+ 3 months claim period from BHEL Consortium Bank</p> <p><b>d.I&amp;C/Supervision:</b> 100% on completion of I&amp;C/Supervision and certification line item wise on prorata basis with 15 days credit from the date of submission of complete set of documentation</p> <p><b>e.O&amp;M:</b> 100% O&amp;M Charges are payable as per RFQ terms against report certified by BHEL with 15 days credit from the date of submission of complete set of documentation</p> | <p>f. 100% of PO value with taxes and freight will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later+ submission of PBG valid for warranty period +3 months claim period from BHEL consortium bank if applicable.</p> |

|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice &amp; Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                       |
| <b><u>IMPORT<br/>PROCUREMENT</u></b>         | <p>g. 80% of basic supply value(excluding I&amp;C charges) will be paid will be paid with 45 days credit against sight draft from the date of AWB/BOL on submission of complete set of documents as n PO.</p> <p>h. 10% of basic supply value will be paid on completion of I&amp;C against submission of supplementary invoice with proof of completion of I&amp;C along with I&amp;C charges (if Any)</p> <p>i. Balance 10% (retention money) against submission of supplementary invoice along with PBG valid for Warranty Period+ 3 months clam period from BHEL Consortium Bank</p> <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice &amp; Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p> | <p>j. 100% of PO value will be paid against sight draft with 45 days credit from the date of dispatch or 15 days credit from the date of submission of complete set of documents whichever is later + submission of PBG valid for Warranty period + 3months claim period from BHEL consortium bank if applicable.</p> |
| <b><u>HIGH-SEA SALES<br/>PROCUREMENT</u></b> | <p>k. 100% of basic value will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later</p> <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice &amp; Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p>                                                                                                                                                                                                                                                                                                                                                                                    | <p>l. 100% of basic value will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later.</p>                                                                                                                |

**1. Erection and Commissioning:**

**Evaluation methodology:** Unless and otherwise specified in SCC, E&C charges should not be less than 10% of the main supply value. In case the quoted total E&C value is less than 10% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards E&C charges.

**Payment term:** 100% E&C charges along with tax as applicable, will be paid in 15 days credit from the date of submission of supplementary invoice/documents against proof of completion of E&C.

**2. Erection Supervision and Commissioning:**

**Evaluation methodology:** Unless and otherwise specified in SCC, E&C charges should not be less than 5% of the main supply value. In case the quoted total E&C value is less than 5% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards E&C charges.

**Payment term:** 100% E&C charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of E&C.

**3. Comprehensive Annual Maintenance Contract:**

**Evaluation methodology:** Unless and otherwise specified in SCC, CAMC will be applicable for a period of 04 years from the date of expiry of warranty period (or) from the date of completion of commissioning of equipment, whichever is later and the total CAMC value should not be less than 20% of the main supply value. In case the quoted total CAMC value is less than 20% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards CAMC charges.

**Payment terms:** 100% CAMC charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of CAMC on quarterly basis.

**4. Terms of Payment for Training:** 100% payment will be made in 45 days from the date of completion of Training or 15 days from the date of submission of complete set of invoice along with documentary evidence, whichever is later.**LOADING FACTORS FOR DEVIATION IN PAYMENT TERMS (APPLICABLE FOR IMPORT PROCUREMENT ONLY):**

- (i) For offers received with Sight draft payment term in place of Usance draft, loading applicable will be 1.0% of basic value.
- (ii) For offers received with Letter of Credit payment term with Usance of 45 days, loading applicable will be 2.5% of basic value.

Additional loading of 2% will be applicable for payment term as Letter of Credit at Sight.

5. Any payment term with credit period of less than 45 days for indigenous supply/HSS and any other variation of payment terms are liable for rejection.
6. Standard payment terms indicated in Clauses: **F (a), (b), (c), (d), (e), (f), (g), (h), (i) & (j) ,(k),(l) will not attract any loading.**

**Note 1:** Basic value of Purchase Order mentioned above will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable). Wherever the Purchase Order is split into import portion and indigenous portion of supply, minimum % to be quoted for Services, wherever mentioned, will be of both purchase order values put together.

**Note 2:** In case of multiple packages/units in a power plant, payment of E&C charges will be processed on pro-rata basis.

**Note 3:** No deviation will be permitted from the duration of Guarantee/Warranty and/or Comprehensive Annual Maintenance Contract period specified in SCC.

#### **G. Terms & Conditions to be complied under GST regime:**

1. All invoices to contain BHEL-EDN (buyer) GSTIN number: 29AAACB4146P1ZB. However, for CGST +SGST/UGST billing outside the state of Karnataka, invoice has to be generated with BHEL's Nodal Agency GSTIN number. Address of Nodal Agency along with GSTIN number will be provided by BHEL at the time of issuing dispatch clearance.
2. The Bidder shall mention Bidder's GSTIN number in all quotations and Invoices submitted.
3. The Bidder shall also mention HSN (Harmonized System of Nomenclature) / SAC (Services Accounting Code) mandatorily in all quotations and invoices submitted.
4. Invoice submitted should be in the format as specified under GST Laws viz., all details as mentioned in Invoice Rules like GST registration number(GSTIN), invoice number with date of issue, quantity, rate, value, taxes with nomenclature – CGST, SGST, UGST, IGST mentioned separately, HSN Code / SAC Code etc. Invoice should be submitted in original for buyer plus duplicate for credit availment.
5. Payment of GST to Vendor will be made only if it is matching with data uploaded by the Vendor in GST portal.
6. For invoices paid on Reverse charge basis – “Tax payable on reverse charge basis” to be mentioned on the invoice.
7. In case GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount will be recoverable from vendor along with interest levied/ leviable on BHEL.
8. In case vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL

towards such ITC reversal as per GST law will be recoverable from vendor/contractor along with interest levied/leviable on BHEL.

9. Vendor should intimate BHEL immediately on the same date of invoicing without any delay.
10. In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the supplies, within the calendar month notified by BHEL.
11. Bidders to note that Rules & Regulations pertaining to E-way bill system are to be strictly adhered to, as and when notified by Govt. authorities.

#### H. Performance bank guarantee (PBG):

Performance bank guarantee (PBG) will be applicable as called in the tender documents. Unless otherwise specified in the SCC, the PBG against performance of the contract shall be valid for a period of 24 months from the date of dispatch of goods + claim period of 03 months, for a value equal to 10 % of the basic value of the purchase order which will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable).

1. The BG issued in Indian Rupees by Banks in India is to be executed on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Bank issuing the guarantee.
2. No deviation for the duration and value of PBG will be permitted.
3. PBG shall be from any of the BHEL consortium of bankers (**refer Annexure VI**).
4. PBGs from nationalized banks are also acceptable.
5. PBG should be sent directly by the bank to the dealing executive mentioned in the purchase order located at the address mentioned in the purchase order.
6. PBG should be in the format specified (**refer Annexure VII**). No deviation to this format will be allowed. However, in case BHEL changes the PBG format, bidder shall honor the same.
7. Bank Guarantee should be enforceable in Bangalore.
8. In Case of Bank Guarantees submitted by Foreign Vendors-
  - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in Bangalore.
  - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)

b.1 Please note that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favor of the Indian Bank's (BHEL's Consortium Bank) branch in India. It shall be noted that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 is required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

9. Expired PBGs will be returned only after expiry of the claim period.

10. PBG shall not be applicable for spares.

#### **I. PROVISIONS APPLICABLE FOR MSE VENDORS (MICRO AND SMALL ENTERPRISES) :**

Benefits/facilities as applicable for Micro and Small Enterprises (MSEs) shall be available to MSEs registered with Government designated authorities as per the Purchase & Price Preference Policy of the Government subject to them becoming eligible otherwise.

Vendors who qualify as MSE vendors are requested to submit applicable certificates (as specified by the Ministry of Micro, Small and Medium Enterprises) at the time of vendor registration. Vendors have to submit the Udyog Aadhaar Memorandum (UAM) /UDYAM Registration certificate along with attested copy of a CA certificate (Annexure VIII) applicable for the relevant financial year (latest audited) along with the tender documents in the Part-I bid to avail the applicable benefits.

Date to be reckoned for determining the deemed validity will be the date of bid opening (Part-I in case of two-part bid and three-part bid).

Documents have to be notarized/attested by a Gazetted officer and must be valid as on the date of part I bid opening for the vendors to be eligible for the benefits applicable for MSE vendors. Please note that no benefit shall be applicable if any deficiency in the above required documents are not submitted before the price bid opening/Reverse Auction. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal.

Bidders to however note the documents that shall be furnished in order to establish credentials as MSE vendor should be as per the extant statutory requirements specified by the Ministry of Micro, Small and Medium Enterprises.

#### **PURCHASE PREFERENCE FOR MSE VENDORS:**

MSE vendors quoting within a price band of L1 + 15% shall be allowed to supply up to 25% of the requirement against this tender provided

1. The MSE vendor matches the L1 price.
2. L1 price is from a non MSE vendor.
3. L1 price will be offered to the vendor nearest to L1 in terms of price ranking (L2 - nearest to L1). In case of non-acceptance by the MSE vendor (L2), next ranking

MSE vendor will be offered who is within the L1 + 15% band (if L3 is also within 15% band).

4. 3% of the 25% will be earmarked for women owned MSEs.
5. 25% of the 25% (i.e., 6.25% of the total enquired quantity) will be earmarked for SC/ST owned MSE firms provided conditions as mentioned in (1) & (2) are fulfilled.
6. In case where no SC/ST category firms are meeting the conditions mentioned in (1) and (2) or have not participated in the tender, the 6.25% of earmarked quantity for SC/ST owned MSE firms will be distributed among the other eligible MSE vendors who have participated in the tender.
7. In case after the bid opening it is seen that no MSE has become L1, then depending on the nature of the item, if it is not possible to split the tendered items/quantities on account of reasons like customer contract requirements of supplying one make for a given project or technical reasons like the tendered item being a system etc., then BHEL would not counter offer the L1 prices even though there may be MSE bidders within the +15% band of L1. Such information that tendered quantity will not be split shall be indicated in the SCC.

**J. INTEGRITY COMMITMENT IN THE TENDER PROCESS, AND EXECUTION OF CONTRACTS:**

1. Commitment by BHEL: BHEL commits to take all measures necessary to prevent corruption in connection with the Tender process and execution of the Contract. BHEL will, during the tender process, treat all bidder / suppliers in a transparent and fair manner, and with equity.
2. Commitment by Bidder(s)/ Contractor(s):
  - a. The Bidder(s)/ Contractor(s) commit(s) to take all measures to prevent corruption and will not directly or indirectly try to influence any decision or benefit which he is not legally entitled to.
  - b. The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding or any actions to restrict competition.
  - c. The Bidder(s)/ Contractor(s) will not commit any offence under the relevant Acts. The Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain or pass on to others, any information or document provided by BHEL as part of business relationship.
  - d. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to the relevant guidelines issued from time to time by Government of India/ BHEL.

If the Bidder(s) / Contractor(s), before award or during execution of the Contract commit(s) a transgression of the above or in any other manner such as to put his reliability or credibility in question, BHEL is entitled to disqualify the Bidder(s) / Contractor (s) from the tender process or terminate the contract and/ or take suitable action as deemed fit.

**K. Integrity Pact (IP):**

- a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner.

A panel of independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those Bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

- b) Please refer Section-8 of the IP for Role and Responsibilities of IEMs (Annexure IX). In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department.”

**L. Fraud prevention policy:**

The Bidder along with its associates/collaborators/sub-contractors/sub-vendors/consultants/service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL Website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice. Fraud prevention policy and List of Nodal Officers shall be hosted on BHEL website, vendor portal of Units/Region intranet.

Annexure

Annexure I  
Guidelines for Indian Agents

- **Definition of Indian Agent:** An Indian Agent of foreign principal is an individual, a partnership, an association of persons, a private or public company, that carries out specific obligation(s) towards processing of BHEL tender or finalization or execution of BHEL's contract on behalf of the foreign supplier.

In case of yes, vendor to note the following and reply accordingly:

- i. BHEL shall deal directly with foreign vendors, wherever required, for procurement of goods. However, if the foreign principal desires to avail of the services of an Indian agent, then the foreign principal should ensure compliance to regulatory guidelines - which require mandatory submission of an Agency Agreement.
- ii. It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.
- iii. The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.
- iv. Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.
- v. Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.
- vi. In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.
- vii. The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure - 'A' shall apply in all such cases.

- viii. The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines of Supplier Evaluation, Approval & Review Procedure (SEARP), before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on [www.bhel.com](http://www.bhel.com).

The responsibility for successful execution of the contract (including indigenous supplies/ services) lies with the OEM/ foreign principal. All bank guarantees to this effect shall be in the scope of the OEM/ foreign principal.

—X—

Vendor's Signature with Seal

Guidelines for Indian Agents of Foreign Suppliers

- 1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BHEL shall apply for registration in the registration form in line with SEARP.
- 1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the Principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/ remuneration/ salary/ retainership being paid by the principal to the agent before the placement of order by BHEL.
- 1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.
- 2.0 **Disclosure of particulars of agents/ representatives in India, if any.**
- 2.1 Tenderers of Foreign nationality shall furnish the following details in their offers:
  - 2.1.1 The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the agents/ representatives in India if any and the extent of authorization and authority given to commit the Principals. In case the agent/ representative be a foreign Company, it shall be confirmed whether it is existing Company and details of the same shall be furnished.
  - 2.1.2 The amount of commission/ remuneration included in the quoted price(s) for such agents/ representatives in India.
  - 2.1.3 Confirmation of the Tenderer that the commission/ remuneration, if any, payable to his agents/ representatives in India, may be paid by BHEL in Indian Rupees only.
- 2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:
  - 2.2.1 The Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any, indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/ representatives.
  - 2.2.2 The amount of commission/ remuneration included in the price (s) quoted by the Tenderer for himself.
  - 2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s), may be paid by BHEL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.
- 2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/ remuneration, if any payable to the agents/ representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.
- 2.4 Failure to furnish correct and detailed information as called for in paragraph 2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BHEL. Besides this there would be a penalty of banning business dealings with BHEL or damage or payment of a named sum.

**ANNEXURE - II**  
**LIST OF INTERNATIONAL GATEWAY AIRPORTS**

For air based consignment, terms of delivery will be on FCA basis from following listed airports only. Vendors are requested to verify this list for use before submission of offer.

| SCHEDULE NO | COUNTRY      | CURRENCY CODE | AIRPORT                                                                               |
|-------------|--------------|---------------|---------------------------------------------------------------------------------------|
| D01         | UK           | GBP           | LONDON (HEATHROW)                                                                     |
| D02         | UK           | GBP           | NEW CASTLE                                                                            |
| D03         | UK           | GBP           | OXFORD. CHETLAM                                                                       |
| D04         | UK           | GBP           | BRISTOL. WELLINGBOROUGH                                                               |
| D05         | UK           | GBP           | BIRMINGHAM                                                                            |
| D06         | UK           | GBP           | EAST MIDLANDS                                                                         |
| D07         | UK           | GBP           | MANCHESTER                                                                            |
| D08         | UK           | GBP           | LEEDS                                                                                 |
| D09         | UK           | GBP           | GLASGOW                                                                               |
| D10         | FRANCE       | EURO          | PARIS (ROISSY) & LYON                                                                 |
| D11         | SWEDEN       | EURO          | STOCKHOLM                                                                             |
| D12         | SWEDEN       | EURO          | GOTHENBERG & MALMO                                                                    |
| D13         | ITALY        | EURO          | ROMA, MILAN                                                                           |
| D14         | ITALY        | EURO          | TURIN, BOLOGNA, FLORENCE                                                              |
| D15         | NETHERLANDS  | EURO          | AMSTERDAM, ROTTERDAM                                                                  |
| D16         | AUSTRIA      | EURO          | VIENNA, LINZ, GRAZ                                                                    |
| D17         | BELGIUM      | EURO          | ANTWERP, BRUSSELS                                                                     |
| D18         | DENMARK      | DKK           | COPENHAGEN                                                                            |
| D19         | JAPAN        | JPY           | TOKYO, OSAKA                                                                          |
| D20         | SINGAPORE    | SGD           | SINGAPORE                                                                             |
| D21         | CANADA       | CAD           | TORONTO                                                                               |
| D22         | CANADA       | CAD           | MONTREAL                                                                              |
| D23         | USA          | USD           | NEW YORK, BOSTON                                                                      |
| D24         | USA          | USD           | CHICAGO                                                                               |
| D25         | USA          | USD           | SAN FRANCISCO, LOS ANGELES                                                            |
| D26         | USA          | USD           | ALANTA, HOUSTON                                                                       |
| D27         | GERMANY      | EURO          | MUNICH, KOLN, DUSSELDORF, HANNOVER, HAMBURG, STUTTGART, DAMSTADT, MANIHIEM, NURUMBERG |
| D28         | GERMANY      | EURO          | FRANKFURT                                                                             |
| D29         | GERMANY      | EURO          | BERLIN                                                                                |
| D30         | SWITZERLAND  | SFR           | BASLE, ZURICH, GENEVA                                                                 |
| D31         | SPAIN        | EURO          | BARCELONA                                                                             |
| D32         | AUSTRALIA    | AUD           | SYDNEY                                                                                |
| D33         | AUSTRALIA    | AUD           | MELBOURNE                                                                             |
| D34         | AUSTRALIA    | AUD           | PERTH                                                                                 |
| D35         | CZECH        | EURO          | PRAGUE                                                                                |
| D36         | HONG KONG    | HKD           | HONG KONG                                                                             |
| D37         | NEW ZELAND   | NZD           | AUCKLAND                                                                              |
| D38         | RUSSIA       | USD           | MOSCOW                                                                                |
| D39         | SOUTH KOREA  | USD           | KIMPO INTERNATIONAL, INCHEON                                                          |
| D40         | FINLAND      | EURO          | HELSINKI                                                                              |
| D41         | ROMANIA      | EURO          | BUCHAREST                                                                             |
| D42         | NORWAY       | EURO          | OSLO                                                                                  |
| D43         | IRELAND      | EURO          | DUBLIN                                                                                |
| D44         | ISRAEL       | USD           | TEL AVIV                                                                              |
| D45         | UAE          | USD           | DUBAI                                                                                 |
| D46         | OMAN         | USD           | MUSCAT                                                                                |
| D47         | EGYPT        | USD           | CAIRO                                                                                 |
| D48         | TAIWAN       | USD           | TAIPEI                                                                                |
| D49         | UKRAINE      | USD           | KIEV                                                                                  |
| D50         | CHINA        | USD           | SHANGHAI, SHENZHEN                                                                    |
| D51         | PHILIPINES   | USD           | MANILA                                                                                |
| D52         | MALAYSIA     | USD           | KUALALUMPUR, PE NANG                                                                  |
| D53         | CYPRUS       | USD           | LARNACA                                                                               |
| D54         | SOUTH AFRICA | USD           | JOHANNESBERG, DURBAN                                                                  |
| D55         | SLOVAKIA     | EURO          | BARTISLOVA                                                                            |
| D56         | SAUDI ARABIA | SAR           | RIYADH                                                                                |
| D57         | TURKEY       | EURO          | ISTANBUL                                                                              |
| D58         | THAILAND     | USD           | BANGKOK                                                                               |
| D59         | BRAZIL       | USD           | SAO PAULO, RIO DE JANEIRO                                                             |

### **ANNEXURE – III**

#### **DISCREPANCY IN WORDS & FIGURES – QUOTED IN PRICE BID**

Following guidelines will be followed in case of discrepancy in words & figures-quoted in price bid:

(a) If, in the price structure quoted for the required goods/services/works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.

(b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

(d) If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.

**ANNEXURE - IV**  
**Electronic Funds Transfer (EFT) OR**  
**Paylink Direct Credit Form**

Please Fill up the form in **CAPITAL LETTERS** only.

TYPE OF REQUEST(Tick one): ☐ CREATE ☐ CHANGE

BHEL Vendor / Supplier Code:

Company Name :

Permanent Account Number(PAN):

Address

City:

PINCODE

STATE

Contact Person(s)

Telephone No:

Fax No:

e-mail id:

1 Bank Name:

2 Bank Address:

3 Bank Telephone No:

4 Bank Account No:

5 Account Type: Savings/Cash Credit

6 9 Digit Code Number of Bank and branch

appearing on MICR cheque issued by Bank

7 Bank IFSC Code(applicable for NEFT )

8 Bank IFSC code(applicable for RTGS)

(Indian Financial System Code)

- A I hereby certify that the particulars given above are true, correct and complete and that I, as a representative for the above named Company, hereby authorise BHEL, EDN, Bangalore to electronically deposit payments to the designated bank account.
- B If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL / transferring Bank responsible.
- C This authority remains in full force until BHEL, EDN, Bangalore receives written notification requesting a change or cancellation.
- D I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under ECS / EFT.

Date:

Authorised Signatory:

Designation:

Telephone No. with STD Code

Company Seal

**Bank Certificate**

We certify that \_\_\_\_\_ has an Account No \_\_\_\_\_ with us and we confirm that the bank details given above are correct as per our records.

Date:

Place:

(.....)

Signature

Please return completed form along with a blank cancelled cheque or photocopy thereof to:

Bharath Heavy Electricals Ltd,

Attn:

Electronics Division, Mysore Road,

BANGALORE - 560 026

In case of any Query, please call concerned purchase executive.

**ANNEXURE - V**  
**PRESENT PROCEDURE FOR SALE IN TRANSIT (HIGH SEA SALES)**

In case of High Sea Sales, vendor should submit following documents:

**1. ORIGINAL HIGH SEA SALES AGREEMENT**

- Sale agreement (on Rs. 200/- non-judicial stamp paper & notarised with 2 witnesses with identity) has to be signed between BHEL and the Party importing material. The date of the sale documents should be in between the date of House Air Way Bill / Bill of Lading and before landing of the goods in Indian origin.
- Following shall be included in the High Sea Sales Agreement:  
"THE BUYER ALSO UNDERTAKE DISCHARGES, THE OBLIGATION AND FULFILLMENT OF CONDITIONS, IF ANY, ATTACHED TO THE IMPORTATION, ASSESSMENT AND CLEARANCE OF THE GOODS IN TERMS CUSTOMS TARIFF ACT 1975, THE CUSTOMS ACT 1962 & RULES & REGULATIONS MADE THERE UNDER AND OTHER RELEVANT ACTS, ORDERS, NOTIFICATIONS".

**2. ORIGINAL INVOICES: INDIGENOUS RUPEE INVOICE & FOREIGN CURRENCY INVOICE**

- Prices should be C.I.F., designated airport/seaport basis.
- I.E.C., C.S.T., K.S.T. Nos. to be mentioned.
- Description of item (Nomenclature), Unit & Quantity in both the Foreign Currency & the Indigenous Invoice in Rupee shall be exactly as per Purchase Order Description of item, Quantity and Unit. The Indigenous Invoice value shall be exactly as per Purchase Order value.
- Seller should give Foreign Currency Invoice from the original consignor. The Foreign Currency Invoice value should be at least 2% (two per cent) less than the Indigenous Rupee Invoice value in equivalent foreign currency.

**4. ORIGINAL HOUSE AIR WAY BILL/ BILL OF LADING**

- The sale agents should duly endorse House Air Way Bill (HAWB) for air shipments or original Bill of Lading (O.B.L.) for sea shipments and Foreign Currency Invoice in favour of BHEL-EDN.

**5. ORIGINAL CARGO ARRIVAL NOTICE FROM FORWARDER.**

**6. ORIGINAL DELIVERY ORDER ISSUED IN NAME OF BHEL-EDN.**

**7. ORIGINAL PACKING LIST.**

**8. A LETTER TO THE COMMISSIONER OF CUSTOMS FOR EFFECTING ABOVE SALE.**

**9. A LETTER TO THE DEPUTY ASSESSOR (OCTROI) FOR EFFECTING ABOVE SALE IN FAVOUR OF BHEL.**

**REMARKS:** In case vendor needs any clarifications on the above, the same may be sought in writing.



ELECTRONICS DIVISION, BANGALORE

**Annexure-VI**

**BHEL MEMBER BANKS (LIST OF CONSORTIUM BANKS)**

Bank Guarantee (BG) shall be issued from the following banks only:

| Sl. No. | Nationalised Banks        | Sl. No. | Public Sector Banks                                       |
|---------|---------------------------|---------|-----------------------------------------------------------|
| 1       | Allahabad Bank            | 18      | IDBI                                                      |
| 2       | Andhra Bank               |         |                                                           |
| 3       | Bank of Baroda            | Sl. No. | <b>Foreign Banks</b>                                      |
| 4       | Canara Bank               | 19      | CITI Bank N.A                                             |
| 5       | Corporation Bank          | 20      | Deutsche Bank AG                                          |
| 6       | Central Bank              | 21      | The Hongkong and Shanghai Banking Corporation Ltd. (HSBC) |
| 7       | Indian Bank               | 22      | Standard Chartered Bank                                   |
| 8       | Indian Overseas Bank      | 23      | J P Morgan                                                |
| 9       | Oriental Bank of Commerce |         |                                                           |
| 10      | Punjab National Bank      | Sl. No. | <b>Private Banks</b>                                      |
| 11      | Punjab & Sindh Bank       | 24      | Axis Bank                                                 |
| 12      | State Bank of India       | 25      | The Federal Bank Limited                                  |
| 13      | Syndicate Bank            | 26      | HDFC Bank                                                 |
| 14      | UCO Bank                  | 27      | Kotak Mahindra Bank Ltd                                   |
| 15      | Union Bank of India       | 28      | ICICI Bank                                                |
| 16      | United Bank of India      | 29      | IndusInd Bank                                             |
| 17      | Vijaya Bank               | 30      | Yes Bank                                                  |

**Note:**

- All BGs must be issued from BHEL consortium banks listed above.
- This list is subject to changes. Hence vendors are requested to check this list every time before issuing BGs.
- Bank Guarantees issued by Co-operative Banks/Financial Institutions cannot be accepted under any circumstance.

Annexure-VII

**BANK GUARANTEE FOR PERFORMANCE SECURITY**

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at \_\_\_\_\_<sup>1</sup> through its Unit at.....(name of the Unit) having awarded to ( Name of the Vendor / Contractor / Supplier) with its registered office at \_\_\_\_\_<sup>2</sup> hereinafter referred to as the 'Vendor / Contractor / Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated .....<sup>3</sup> valued at Rs.....<sup>4</sup> ( Rupees -----)/FC.....(in words.....) for .....<sup>5</sup> (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to .....% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, ....., (hereinafter referred to as the Bank), having registered/Head office at ..... and inter alia a branch at ..... being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs -- .....<sup>6</sup> ( Rupees -----) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. \_\_\_\_\_.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

We the .....bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till

all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We .....BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor / Contractor / Supplier 's liabilities.

This Guarantee shall remain in force upto and including.....<sup>7</sup> and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the .....<sup>8</sup>we shall be discharged from all liabilities under this guarantee thereafter.

We, ..... BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....<sup>6</sup>
- b) This Guarantee shall be valid up to .....<sup>7</sup>
- c) Unless the Bank is served a written claim or demand on or before .....<sup>8</sup> all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, \_\_\_\_\_ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of  
(Name of the Bank)

Dated.....

Place of Issue.....

<sup>1</sup> NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

<sup>2</sup> NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

<sup>3</sup> DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

<sup>4</sup> CONTRACT VALUE

<sup>5</sup> PROJECT/SUPPLY DETAILS

<sup>6</sup> BG AMOUNT IN FIGURES AND WORDS

<sup>7</sup> VALIDITY DATE

<sup>8</sup> DATE OF EXPIRY OF CLAIM PERIOD

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**Annexure – VIII**  
**(Applicable only for MSE Suppliers)**

**Certificate by Chartered Accountant on letterhead**

This is to certify that M/s. \_\_\_\_\_  
(hereinafter referred to as 'enterprise') having P A N Number \_\_\_\_\_ and  
UDYAM Registration Number \_\_\_\_\_, registered office at  
\_\_\_\_\_ is falling under the  
category \_\_\_\_\_ (**Micro / Small / Medium**) under MSMED Act 2006. (Copy of UDYAM  
Registration Certificate to be enclosed).

The said classification of \_\_\_\_\_ (**Micro / Small / Medium**) is arrived at based on the  
Notifications / guidelines / clarifications issued under Micro, Small and Medium Enterprises  
Development Act, 2006 including the notification S.O.2119 (E) dated 26<sup>th</sup> June 2020.

The Investment of the enterprise in Plant and Machinery or Equipment as at 31<sup>st</sup>  
March'2020 as per Clause - 4 of the Notification is \_\_\_\_\_ (Rupees in Lakhs).

The turnover of the Enterprise for the period ending 31<sup>st</sup> March 2020 as per Clause - 5 of  
the Notification is \_\_\_\_\_ (Rupees in Lakhs).

Date:

(Signature) Name-

Membership number-

Seal of Chartered Accountant with UDIN reference

## **Annexure-X**

### **Restrictions under Rule 144(xi) of General Financial Rules, 2017 amendment dt: 23.07.2020**

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
- II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with India" for the purpose of this Order means :-
  - a. An entity incorporated, established or registered in such a country; or
  - b. A subsidiary of an entity incorporated, established or registered in such a country; or
  - c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
  - d. An entity whose *beneficial owner* is situated in such a country; or
  - e. An Indian (or other) agent of such an entity; or
  - f. A natural person who is a citizen of such a country; or
  - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- IV. The *beneficial owner* for the purpose of (iii) above will be as under:
  1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation--

    - a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company;
    - b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
  2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್  
भारत हेवी इलेक्ट्रिकल्स लिमिटेड



**Bharat Heavy Electricals Limited**

(A Government of India Undertaking)

**ELECTRONICS DIVISION**

P. B. No. 2606, Mysore Road, Bengaluru - 560 026

SCPV: BOS: GCC- Rev 04

**GENERAL COMMERCIAL CONDITIONS FOR CONTRACT**

These 'General Commercial Conditions for Contract for Purchase' herein after referred to as GCC apply to all enquiries, tenders, requests for quotations, orders, contracts and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliveries") to Bharat Heavy Electricals Limited and any of its units, regions or divisions (hereinafter referred to as "BHEL" or the Purchaser) or its projects/ customers.

Any deviations from or additions to these GCC require BHEL's express written consent. **The general terms of business or sale of the vendor shall not apply to BHEL.** Acceptance, receipt of shipments or services or effecting payment shall not mean that the general terms of business or sale of the vendor have been accepted.

Orders, agreements and amendments thereto shall be binding if made or confirmed by BHEL in writing. Only the Purchasing department of BHEL is authorized to issue the Purchase Order or any amendment thereof.

**Definitions:**

Throughout these conditions and in the specifications, the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.

- (a) 'The Purchaser' means Bharat Heavy Electricals Limited, Electronics division, Mysore road, Bangalore 560 026, a Unit of Bharat Heavy Electricals Limited (A Govt. of India Undertaking) incorporated under the Companies Act having its registered office at BHEL House, Siri Fort, New Delhi-110049, India and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
- (b) 'The vendor' means the person, firm, company or organization on whom the Purchase Order is placed and shall be deemed to include the vendor's successors, representative heirs, executors and administrator as the case may be. It may also be referred to as Seller, Contractor or Supplier.
- (c) 'Contract' shall mean and include the Purchase Order incorporating various agreements, viz. tender/ RFQ, offer, letter of intent/acceptance/ award, the General Conditions of Contract and Special Conditions of Contract for Purchase, Specifications, Inspection/ Quality Plan, Schedule of Prices and Quantities, Drawings, if any enclosed or to be provided by BHEL or his authorized nominee and the samples or patterns if any to be provided under the provisions of the contract.

- (d) 'Parties to the Contract' shall mean the 'The Vendor' and the Purchaser as named in the main body of the Purchase Order.

Order of Precedence:

In case of any inconsistency or contradiction between any of the documents, the order of precedence shall be Purchase Order, LOI / LOA, Special Conditions of Contract and General Conditions of Contract for commercial conditions; and specific agreement on technical conditions, RFQ/offer and specification for Technical Conditions.

Interpretation:

In the contract, except where the context requires otherwise:

- (a) Words indicating one gender include all genders;
- (b) Words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) Provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
- (d) "Written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

**APPLICABLE CONDITIONS:**

1. **Price Basis:** All prices shall be firm until the purchase order is executed / completed in all respects. No price variations / escalation shall be permitted, unless otherwise such variations/ escalations are permitted for and agreed up on by BHEL in writing in the PO. In case Price variation/ Exchange rate variation clause if applicable, the same will be mentioned in Special Conditions of Contract (SCC), otherwise firm price only.
2. **Ordering and confirmation of Order:** Vendor shall send the order acceptance on their company letter head/ through e-mail within 1 (ONE) week from the date of receipt of Purchase Order or such other period as specified/ agreed by BHEL. BHEL reserves the right to revoke the order placed if the order confirmation differs from the original order placed. The acceptance of goods/services/supplies by BHEL as well as payments made in this regard shall not imply acceptance of any deviations.

The purchase order will be deemed to have been accepted if no communication to the contrary is received within 1 (ONE) week (or the time limit as specified/agreed by BHEL) from the date of receipt of the purchase order.

3. **Documentation:** After receipt of Purchase Order, vendor should submit necessary documents (if & as applicable) like drawings specified, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/Customer.

At any stage within the contract period, the vendor shall notify of any error, fault or other defect found in BHEL's documents /specifications or any other items for reference. If and to the extent that (taking account of cost and time) any vendor exercising due care would have discovered the error, fault or other defect when examining the documents/specifications before submitting the tender, the time for completion shall not be extended. However, if errors, omissions, ambiguities,

inconsistencies, inadequacies or other defects are found in the vendor's documents, they shall be corrected at his cost, notwithstanding any consent or approval.

**4. Penalty:**

For delay in delivery: In the event of delay in agreed contractual delivery as per Purchase Order, penalty @ 0.5 % (half percent) per week or part thereof but limited to a max of 10% (ten percent) value of undelivered portion (basic material cost) will be applicable. Delivery will commence from the date of issue of Manufacturing clearance along with approved document. The date for which Inspection call is issued by vendor along with test certificates / test reports /Certificate of Conformance / calibration reports, as proof of completion of manufacturing will be treated as date of deemed delivery for penalty calculation. In the absence of furnishing such document indicated above as proof of completion of manufacturing along with inspection call, actual date of inspection will be considered as date of deemed delivery and BHEL will not be responsible for delay in actual date of inspection.

Penalty for delayed delivery if applicable, shall be deducted at the time of first supply payment.

If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted. **GST as applicable will be recovered along with penalty amount.**

- 5. Contract variations (Increase or decrease in the scope of supply):** BHEL may vary the contracted scope as per requirements at site. If vendor is of the opinion that the variation has an effect on the agreed price or delivery period, BHEL shall be informed of this immediately in writing along with technical details. Where unit rates are available in the Contract, the same shall be the basis for such additional work. Vendor shall not perform additional work before BHEL has issued written instructions/ amendment to the Purchase Order to that effect. The work which the vendor should have or could have anticipated in terms of delivering the service(s) and functionality (i.e.) as described in this agreement, or which is considered to be the result of an attributable error on the vendor's part, shall not be considered additional work.

- 6. Pre Shipment Inspection:** Prior written notice of at least 10 days shall be given along with internal test certificates/Certificate of Conformance (COC) and applicable test certificates. Materials will be inspected by BHEL-EDN-QS/CQS or BHEL nominated Third Party Inspection Agency (TPIA) or BHEL authorized Inspection Agency or Customer / Consultant or jointly by BHEL & Customer / consultant. All tests have to be conducted as applicable in line with approved Quality plan or QA Checklist or Purchase specification and original reports shall be furnished to BHEL-EDN, Bangalore for verification/acceptance for issue of dispatch clearance. **BHEL reserves the right for conducting repeat test, if required.**

All costs related to inspections & re-inspections shall be borne by vendor. Whether the Contract provides for tests on the premises of the vendor or any of his Sub-contractor/s, vendor shall be responsible to provide such assistance, labour, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such

other special tests shall be borne by BHEL only if specifically agreed to in the purchase order.

7. **Transit Insurance:** Transit insurance coverage between vendor's works and project site shall be to the account of BHEL, unless specifically agreed otherwise. However, vendor shall send intimation directly to insurance agency (*as mentioned in dispatch instructions issued by BHEL*) through fax/courier/e-mail, immediately on dispatch of goods for covering insurance. A copy of such intimation sent by vendor to insurance agency shall be given to BHEL along with dispatch documents (*Email communication to Insurance Agency must be "CC" to BHEL*). Dispatch documents will be treated as incomplete without such intimation copy. BHEL shall not be responsible for sending intimations to insurance agency on behalf of the vendor.

8. **Mode of dispatch:**

Indigenous Scope: By road on Door Delivery Consignee Copy attached basis through your approved transporter (unless otherwise indicated in Dispatch Instructions), only on receipt of Despatch Clearance from BHEL.

Imported Scope: By Air/Sea through BHEL approved Freight Forwarder/supplier approved Consolidator respectively as per agreed contractual terms, only on receipt of Dispatch Clearance from BHEL.

9. **Changes in Statutory levies:**

If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the execution of Contract, which was or will be assessed on the bidder in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction there from, as the case may be. However, these adjustments would be restricted to direct transactions between BHEL and the bidder /agent of foreign bidder (if applicable). These adjustments shall not be applicable on procurement of raw materials, intermediary components etc. by the bidder /agent.

10. **Availing duty/tax exemption benefits by bidder, wherever applicable:** BHEL shall issue the required Certificate/s, as per relevant policies of the Govt. of India, to facilitate the bidders to avail any such benefits under the Contract. In case of failure of the bidders to receive the benefits partly or fully from the Govt. of India and/or in case of any delay in receipt of such benefits, BHEL shall neither be liable nor responsible in any manner whatsoever.

11. **Taxes against sub-vendor dispatches:** All taxes/levies, as applicable in respect of all components, equipment and material to be dispatched directly from the sub-vendor's works to Site irrespective of the fact whether such taxes and levies are assessable and chargeable on Vendor or the BHEL, shall be to the vendor's account and no separate claim in this regard will be entertained by BHEL.

12. **High Sea Sales (HSS):** Customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors.

Any delay in submission of complete/correct HSS documents to BHEL may incur demurrage charges. All demurrage charges on account of incomplete /incorrect HSS

documents submission by vendor will be to vendor's account and all such charges will be recovered from any of the available vendor bills with BHEL.

13. **Packaging and dispatch:** The Seller shall package the goods safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by Sea/ Air / Rail/ Road to its destination suitably protected against loss, damage, corrosion in transit and the effect of tropical salt laden atmosphere. The packages shall be provided with fixtures/ hooks and sling marks as may be required for easy and safe handling. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols / instructions. Hazardous material should be notified as such and their packing, transportation and other protection must conform to relevant regulations.

The packing, shipping, storage and processing of the goods must comply with the prevailing legislation and regulations concerning safety, the environment and working conditions. Any Imported/Physical Exports items packed with raw/ solid wood packing material should be treated as per ISPM – 15 (fumigation) and accompanied by Phytosanitary / Fumigation certificate. If safety information sheets (MSDS – Material Safety Data Sheet) exist for an item or the packaging, vendor must provide this information without fail along with the consignment.

Each package must be marked with Consignee name, Purchase order number, Package number, Gross weight and net weight, dimensions (L x B x H) and Seller's name. Packing list of goods inside each package with PO item number and quantity must also be fixed securely outside the box to indicate the contents of each box. Total number of packages in the consignment must also be indicated in the packing list.

Separate packing & identification of items should be as follows.

- (a) Main Scope - All items must be tagged with part no. & item description.
- (b) Commissioning accessories/spares - All items must be tagged with part no. & item description.
- (c) Mandatory spares - All items must be tagged with part no. & item description.

Nevertheless, vendor shall adhere to dispatch & packing instructions issued by BHEL at the time of dispatch. Approximate Package Dimension shall be indicated in Offer/Quotation \_\_\_\_L (ft) x \_\_\_\_B (ft) x \_\_\_\_H (ft). Any Over Dimensional Consignment (ODC) in any consignment dimension \_\_\_\_40\_\_L (ft) x \_\_\_\_8\_\_B (ft) x \_\_\_\_8\_\_H (ft) the same shall be indicated in offer.

14. **Assignment of Rights & Obligations; Subcontracting:** Vendor is not permitted to subcontract the delivery or any part thereof to third party or to assign the rights and obligations resulting from this agreement in whole or in part to third parties without prior written permission from BHEL. Any permission or approval given by the BHEL shall, however, not absolve the vendor of the responsibility of his obligations under the Contract.
15. **Progress report:** Vendor shall render such report as to the progress of work and in such form as may be called for by the concerned purchase officer from time to time. The submission and acceptance of such reports shall not prejudice the rights of BHEL in any manner.

16. **Non-disclosure and Information Obligations:** Vendor shall provide with all necessary information pertaining to the goods as it could be of importance to BHEL. Vendor shall not reveal any specified confidential information that may be divulged by BHEL to Vendor's employees not involved with the tender/ contract & its execution and delivery or to third parties, unless BHEL has agreed to this in writing beforehand. Vendor shall not be entitled to use the BHEL name in advertisements and other commercial publications without prior written permission from BHEL.

17. **Cancellation /Termination of contract:** BHEL shall have the right to completely or partially terminate the agreement by means of written notice to that effect. Termination of the Contract, for whatever reason, shall be without prejudice to the rights of the parties accrued under the Contract up to the time of termination.

BHEL shall have the right to cancel/foreclose the Order/ Contract, wholly or in part, in case it is constrained to do so on account of any decline, diminution, curtailment or stoppage of the business.

18. **Risk Purchase Clause:** In case of failure of supplier, BHEL at its discretion may make purchase of the materials / services not supplied / rendered in time at the RISK & COST of the supplier. Under such situation, the supplier who fails to supply the goods in time shall be wholly liable to make good to BHEL any loss due to risk purchase.

In case of items demanding services at site like erection and commissioning, vendor should send his servicemen/representatives within 7 days from the service call. In case a vendor fails to attend to the service call, BHEL at its discretion may also make arrangements to attend such service by other parties at the **RISK & COST** of the supplier. Under such situation the supplier who fails to attend the service shall be wholly liable to make good to BHEL any loss due to risk purchase/service including additional handling charges due to the change.

19. **Shortages:** In the event of shortage on receipt of goods and/or on opening of packages at site, all such shortages, *caused by supplier's act or omission*, shall be made good at *free of cost* within a reasonable time that BHEL may allow from such intimation.

**Transit Damages:** In the event of receipt of goods in damaged condition or having found them so upon opening of packages at site, supplier shall make good of all such damages within a reasonable time from such intimation by BHEL. *In case BHEL raises an insurance claim, the cost of material limited to insurance settled amount less handling charges will be reimbursed to supplier.*

20. **Remedial work:** Notwithstanding any previous test or certification, BHEL may instruct the vendor to remove and replace materials/goods or remove and re-execute works/services which are not in accordance with the purchase order. Similarly, BHEL may ask the vendor to supply materials or to execute any services which are urgently required for any safety reasons, whether arising out of or because of an accident, unforeseeable event or otherwise. In such an event, Vendor shall provide such services within a reasonable time as specified by BHEL.

21. **Indemnity Clause:** Vendor shall comply with all applicable safety regulations and take care for the safety of all persons involved. Vendor is fully responsible for the safety of its personnel or that of his subcontractor's men / property, during execution of the

Purchase Order and related services. All statutory payments including PF, ESI or other related charges have to be borne by the vendor. Vendor is fully responsible for ensuring that all legal compliances are followed in course of such employment.

22. **Product Information, Drawings and Documents:** All specified drawings, technical documents or other technical information received by Vendor from BHEL or vice versa shall not, without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the Disclosing party, otherwise be used or copied, reproduced, transmitted or communicated to third parties. All information and data contained in general product documentation, whether in electronic or any other form, are binding only to the extent that they are by reference expressly included in the contract.

Vendor, as per agreed date/s but not later than the date of delivery, provide free of charge information and drawings which are necessary to permit and enable BHEL to erect, commission, operate and maintain the product. Such information and drawings shall be supplied in as many numbers of copies as may be agreed upon.

All intellectual properties, including designs, drawings and product information etc. exchanged during the formation and execution of the Contract shall continue to be the property of the disclosing party.

23. **Intellectual Property Rights, Licenses:** If any Patent, design, Trade mark or any other intellectual property rights apply to the delivery (goods/related service) or accompanying documentation shall be the exclusive property of the Vendor and BHEL shall be entitled to the legal use thereof free of charge by means of a nonexclusive, worldwide, perpetual license. All intellectual property rights that arise during the execution of the Purchase Order/ contract for delivery by vendor and/or by its employees or third parties involved by the vendor for performance of the agreement shall belong to BHEL. Vendor shall perform everything necessary to obtain or establish the above mentioned rights. The Vendor guarantees that the delivery does not infringe on any of the intellectual property rights of third parties. The Vendor shall do everything necessary to obtain or establish the alternate acceptable arrangement pending resolution of any (alleged) claims by third parties. The Vendor shall indemnify BHEL against any (alleged) claims by third parties in this regard and shall reimburse BHEL for any damages suffered as a result thereof.

24. **Force Majeure:** Notwithstanding anything contained in the purchase order or any other document relevant thereto, neither party shall be liable for any failure or delay in performance to the extent said failures or delays are caused by the "Act of God" and occurring without its fault or negligence, provided that, force majeure will apply only if the failure to perform could not be avoided by the exercise of due care and vendor doing everything reasonably possible to resume its performance.

A party affected by an event of force majeure which may include fire, tempest, floods, earthquake, riot, war, damage by aircraft etc., shall give the other party written notice, with full details as soon as possible and in any event not later than seven (7) calendar days of the occurrence of the cause relied upon. If force majeure applies, dates by which performance obligations are scheduled to be met will be extended for a period of time equal to the time lost due to any delay so caused.

Notwithstanding above provisions, in an event of Force Majeure, BHEL reserves for itself the right to cancel the order/ contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of deliveries and other schedules.

**25. Warranty:**

Wherever required, and so provided in the specifications/ Purchaser Order, the Seller shall ensure that the goods supplied shall comply with the specifications laid down, for materials, workmanship and performance.

If the vendor fails to take proper corrective action to repair/replace defects satisfactorily within a reasonable period, Purchaser shall be free to take corrective action as may be deemed necessary at Vendor's Risk and Cost after giving notice to Vendor, including arranging supply of goods from elsewhere at sole risk and cost of Vendor.

Unless otherwise specified in SCC, warranty period shall be applicable for a period of 24 months from the date of delivery of goods or 18 months from the date of commissioning of goods, whichever is earlier. The warranty period as described above shall apply afresh to replaced, repaired or re-executed parts of a delivery. Unless otherwise specifically provided in the Purchase Order, Vendor's liability shall be co terminus with the expiration of the applicable warranty period.

**26. Limitation of Liability:** Vendor's liability towards this contract is limited to a maximum of 100% of the contract value and consequential damages are excluded. However, the limits of liability will have no effect in cases of criminal negligence or willful misconduct.

The total liability of Vendor for all claims arising out of or relating to the performance or breach of the Contract or use of any Products or Services or any order shall not exceed the total Contract price.

**27. Liability during Warranty:** Vendor shall arrange replacement / repair of all the defective materials / services under its obligation during the warranty period. The rejected goods shall be taken away by vendor and replaced / repaired. In the event of the vendor's failure to comply, BHEL may take appropriate action including disposal of rejections and replenishment by any other sources at the cost and risk of the vendor. In case, defects attributable to vendor are detected during Warranty period or where the commissioning call is issued within the warranty period, vendor shall be responsible for replacement/ repair of the goods as required by BHEL at vendor's cost even after expiry of warranty period.

Further if the equipment or any part thereof cannot be used by reason of such defect and/or making good of such defect, the warranty period of the equipment or such part, as the case may be, shall be extended by a period equal to the period during which the equipment or such part cannot be used by BHEL because of any of the aforesaid reasons. Upon correction of the defects in the facilities or any part thereof by repair/replacement, such repair/replacement shall have the warranty period for a

period of twelve (12) months from the time such replacement/repair of the equipment or any part thereof has been completed.

28. **Liability after warranty period:** At the end of the warranty, the Vendor's liability ceases except for latent defects. For the purpose of this clause, latent defects shall be the defects inherently lying within the material or arising out of design deficiency which do not manifest themselves during the warranty Period, but later. The Contractor's liability for latent defects warranty for the equipment including spares shall be limited to a period of six months from the end of the warranty period of the respective equipment including spares or first time commissioning, whichever is later but not later than one (01) year from the date of expiry of warranty period.
29. **Compliance with Laws:** Vendor shall, in performing the contract, comply with all applicable laws. The vendor shall make all remittances, give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the laws in relation to the execution and completion of the contract and for remedying of any defects; and the Contractor shall indemnify and hold BHEL harmless against and from the consequences of any failure to do so.
30. **Settlement of Disputes:** Except as otherwise specifically provided in the Purchase Order, decision of BHEL shall be binding on the vendor with respect to all questions relating to the interpretation or meaning of the terms and conditions and instructions herein before mentioned and as to the completion of supplies/work/services, other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the contract, instructions, orders or these conditions or otherwise concerning the supply or the execution or failure to execute the order, whether arising during the schedule of supply/work or after the completion or abandonment thereof. Any disputes or differences among the parties shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration. Vendor shall continue to perform the contract, pending settlement of dispute(s).
31. **Arbitration Clause in case of Contract with vendors other than Public Sector Enterprise (PSE) or a Government Department:**

#### **ARBITRATION & CONCILIATION**

The parties shall attempt to settle any disputes or difference arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, or in connection with this contract through friendly discussions. In case no amicable settlement can be reached between the parties through such discussions, in respect of any dispute; then, either Party may, by a notice in writing to the other Party refer such dispute or difference to the sole arbitration of an arbitrator appointed by Head of the BHEL-EDN. Such Sole Arbitrator appointed, shall conduct the arbitration in English language.

The Arbitrator shall pass a reasoned award and the award of the Arbitration shall be final and binding upon the Parties.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Bangalore. The cost of arbitration shall be borne as decided by the Arbitrator upon him entering the reference. Subject to the Arbitration Clause as above, the Courts at Bangalore alone shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract.

Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the parties shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and efficiency in a professional manner except where the Contract has been terminated by either Party in terms of this Contract.

Arbitration Clause in case of Contract with a Public Sector Enterprise (PSE) or a Government Department:

In the event of any dispute or difference relating to the interpretation and application of the provisions of the Contract, such dispute or difference shall be referred by either party for Arbitration to the Sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any Party aggrieved by such Award may make further reference for setting aside or revision of the Award to the Law Secretary, Department of Legal Affairs, Ministry of Law and Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary or Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the Parties hereto finally and conclusively. The Parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.'

32. **Applicable Laws and Jurisdiction of Courts:** Prevailing Indian laws both substantive and procedural, including modifications thereto, shall govern the Contract. Subject to the conditions as aforesaid, the competent courts in Bangalore alone shall have jurisdiction to consider over any matters touching upon this contract.
33. **General Terms:** That any non-exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents.

That the headings used in this agreement are for convenience of reference only.

That all notices etc., to be given under the Purchase order shall be in writing, type script or printed and if sent by registered post or by courier service to the address given in this document shall be deemed to have been served on the date when in the ordinary course, they would have been delivered to the addressee.

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL. The IP as enclosed with the tender (total 7 sheets) is to be submitted (duly signed by authorized signatory who signs in the offer) along with technocommercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification. Details of IEM for this tender is furnished below: Sh Virendra Bahadur Singh, IPS (Retd.) and Sh. Arun Chandra Verma, IPS (Retd.)

(b) Please refer Section-8 of the IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender. No routine correspondence shall be addressed to the IEM (phone/post/email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/issues shall be addressed directly to the tender issuing (procurement) department

## **INTEGRITY PACT**

### **Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at “BHEL House”, Siri Fort, New Delhi – 110049 (India) hereinafter referred to as “The Principal”, which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

### **and**

\_\_\_\_\_, (description of the party along with address), hereinafter referred to as “The Bidder/ Contractor” which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

### **Preamble**

The Principal intends to award, under laid-down organizational procedures, contract/s for

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

## **Section 1 – Commitments of the Principal**

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principle:-

- 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
  - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
  - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

## **Section 2 – Commitments of the Bidder(s)/ Contractor(s)**

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender

process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in

order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

### **Section 3 – Disqualification from tender process and exclusion from future Contracts**

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidders(s)/ Contractor(s) from the

tender process or take action as per the separate “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” framed by the Principal.

## **Section 4 – Compensation for Damages**

4.1 If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

## **Section 5 – Previous Transgression**

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

## **Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors**

6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder’s/ Contractor’s contract value with the Principal.

6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

## **Section 7 – Criminal Charges against violating Bidders/ Contractors /Subcontractors**

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

## **Section 8 –Independent External Monitor(s)**

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or

take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word ‘Monitor’ would include both singular and plural.

## **Section 9 – Pact Duration**

9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

## Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

-----  
For & On behalf of the Principal  
(Office Seal)

-----  
For & On behalf of the Bidder/ Contractor  
(Office Seal)

Place-----  
Date-----

Witness: \_\_\_\_\_  
(Name & Address) \_\_\_\_\_

Witness: \_\_\_\_\_  
(Name & Address) \_\_\_\_\_

F.No.6/18/2019-PPD  
Ministry of Finance  
Department of Expenditure  
Public Procurement Division

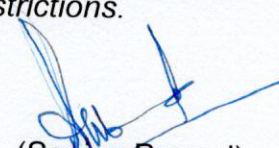
161, North Block,  
New Delhi  
23rd July, 2020

**Office Memorandum**

**Subject: Insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017**

Rule 144 of the General Financial Rules 2017 entitled 'Fundamental principles of public buying', has been amended by inserting sub-rule (xi) as under:

*Notwithstanding anything contained in these Rules, Department of Expenditure may, by order in writing, impose restrictions, including prior registration and/or screening, on procurement from bidders from a country or countries, or a class of countries, on grounds of defence of India, or matters directly or indirectly related thereto including national security; no procurement shall be made in violation of such restrictions.*

  
(Sanjay Prasad)  
Joint Secretary (PPD)  
Email ID: [js.pfc2.doe@gov.in](mailto:js.pfc2.doe@gov.in)  
Telephone: 011-23093882

To,

- (1) Secretaries of All Ministries/ Departments of Government of India
- (2) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi



F.No.6/18/2019-PPD  
Ministry of Finance  
Department of Expenditure  
Public Procurement Division

161, North Block,  
New Delhi  
23rd July, 2020

**Order (Public Procurement No. 1)**

**Subject: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017**

Attention is invited to this office OM no. 6/18/2019-PPD dated 23<sup>rd</sup> July 2020 inserting Rule 144 (xi) in GFRs 2017. In this regard, the following is hereby ordered under Rule 144 (xi) on the grounds stated therein:

**Requirement of registration**

1. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority, specified in **Annex I**.
2. This Order shall not apply to (i) cases where orders have been placed or contract has been concluded or letter/notice of award/ acceptance (LoA) has been issued on or before the date of this order; and (ii) cases falling under **Annex II**.

**Transitional cases**

3. Tenders where no contract has been concluded or no LoA has been issued so far shall be handled in the following manner: -
  - a) *In tenders which are yet to be opened, or where evaluation of technical bid or the first exclusionary qualificatory stage (i.e. the first stage at which the qualifications of tenderers are evaluated and unqualified bidders are excluded) has not been completed:* No contracts shall be placed on bidders from such countries. Tenders received from bidders from such countries shall be dealt with as if they are non-compliant with the tender conditions and the tender shall be processed accordingly.
  - b) *If the tendering process has crossed the first exclusionary qualificatory stage:* If the qualified bidders include bidders from such countries, the

entire process shall be scrapped and initiated *de novo*. The *de novo* process shall adhere to the conditions prescribed in this Order.

- c) As far as practicable, and in cases of doubt about whether a bidder falls under paragraph 1, a certificate shall be obtained from the bidder whose bid is proposed to be considered or accepted, in terms of paras 8, 9 and 10 read with para 1 of this Order.

#### Incorporation in tender conditions

- 4. In tenders to be issued after the date of this order, the provisions of paragraph 1 and of other relevant provisions of this Order shall be incorporated in the tender conditions.

#### Applicability

- 5. Apart from Ministries / Departments, attached and subordinate bodies, notwithstanding anything contained in Rule 1 of the GFRs 2017, this Order shall also be applicable
  - a. to all Autonomous Bodies;
  - b. to public sector banks and public sector financial institutions; and
  - c. subject to any orders of the Department of Public Enterprises, to all Central Public Sector Enterprises; and
  - d. to procurement in Public Private Partnership projects receiving financial support from the Government or public sector enterprises/ undertakings.
  - e. Union Territories, National Capital Territory of Delhi and all agencies/ undertakings thereof

#### Definitions

- 6. "Bidder" for the purpose of this Order (including the term 'tenderer', 'consultant' 'vendor' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency, branch or office controlled by such person, participating in a procurement process.
- 7. "Tender" for the purpose of this Order will include other forms of procurement, except where the context requires otherwise.
- 8. "Bidder from a country which shares a land border with India" for the purpose of this Order means

- a) An entity incorporated, established or registered in such a country; or
- b) A subsidiary of an entity incorporated, established or registered in such a country; or
- c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
- d) An entity whose *beneficial owner* is situated in such a country; or
- e) An Indian (or other) agent of such an entity; or
- f) A natural person who is a citizen of such a country; or
- g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

9. "Beneficial owner" for the purpose of paragraph 8 above will be as under:

- (i) In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person(s), has a controlling ownership interest or who exercises control through other means.

Explanation—

- a. "Controlling ownership interest" means ownership of, or entitlement to, more than twenty-five per cent of shares or capital or profits of the company;
- b. "Control" shall include the right to appoint the majority of the directors or to control the management or policy decisions, including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

- (ii) In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

- (iii) In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

- (iv) Where no natural person is identified under (i) or (ii) or (iii) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

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(v) In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

10. "Agent" for the purpose of this Order is a person employed to do any act for another, or to represent another in dealings with third persons.

#### Sub-contracting in works contracts

11. In works contracts, including turnkey contracts, contractors shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. The definition of "contractor from a country which shares a land border with India" shall be as in paragraph 8 above. This shall not apply to sub-contracts already awarded on or before the date of this Order.

#### Certificate regarding compliance

12. A certificate shall be taken from bidders in the tender documents regarding their compliance with this Order. If such certificate given by a bidder whose bid is accepted is found to be false, this would be a ground for immediate termination and further legal action in accordance with law.

#### Validity of registration

13. In respect of tenders, registration should be valid at the time of submission of bids and at the time of acceptance of bids. In respect of supply otherwise than by tender, registration should be valid at the time of placement of order. If the bidder was validly registered at the time of acceptance / placement of order, registration shall not be a relevant consideration during contract execution.

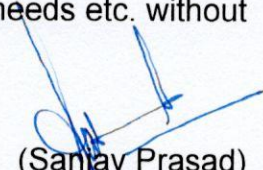
#### Government E-Marketplace

14. The Government E-Marketplace shall, as soon as possible, require all vendors/ bidders registered with GeM to give a certificate regarding compliance with this Order, and after the date fixed by it, shall remove non-compliant entities from GeM unless/ until they are registered in accordance with this Order.

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Model Clauses/ Certificates

15. Model Clauses and Model Certificates which may be inserted in tenders / obtained from Bidders are enclosed as **Annex III**. While adhering to the substance of the Order, procuring entities are free to appropriately modify the wording of these clauses based on their past experience, local needs etc. without making any reference to this Department.

  
(Sanjay Prasad)  
Joint Secretary (PPD)  
Email ID: [js.pfc2.doe@gov.in](mailto:js.pfc2.doe@gov.in)  
Telephone: 011-23093882

To

- (1) Secretaries of All Ministries/ Departments of Government of India for information and necessary action. They are also requested to inform these provisions to all procuring entities.
- (2) Secretary, Department of Public Enterprises with a request to immediately reiterate these orders in respect of Public Enterprises.
- (3) Secretary DPIIT with a request to initiate action as provided under Annex I
- (4) Chief Secretaries/ Administrators of Union Territories/ National Capital Territory of Delhi

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## Annex I: Competent Authority and Procedure for Registration

- A. The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)\*.
- B. The Registration Committee shall have the following members\*:
- i. An officer, not below the rank of Joint Secretary, designated for this purpose by DPIIT, who shall be the Chairman;
  - ii. Officers (ordinarily not below the rank of Joint Secretary) representing the Ministry of Home Affairs, Ministry of External Affairs, and of those Departments whose sectors are covered by applications under consideration;
  - iii. Any other officer whose presence is deemed necessary by the Chairman of the Committee.
- C. DPIIT shall lay down the method of application, format etc. for such bidders as stated in para 1 of this Order.
- D. On receipt of an application seeking registration from a bidder from a country covered by para 1 of this Order, the Competent Authority shall first seek political and security clearances from the Ministry of External Affairs and Ministry of Home Affairs, as per guidelines issued from time to time. Registration shall not be given unless political and security clearance have both been received.
- E. The Ministry of External Affairs and Ministry of Home Affairs may issue guidelines for internal use regarding the procedure for scrutiny of such applications by them.
- F. The decision of the Competent Authority, to register such bidder may be for all kinds of tenders or for a specified type(s) of goods or services, and may be for a specified or unspecified duration of time, as deemed fit. The decision of the Competent Authority shall be final.
- G. Registration shall not be granted unless the representatives of the Ministries of Home Affairs and External Affairs on the Committee concur\*.
- H. Registration granted by the Competent Authority of the Government of India shall be valid not only for procurement by Central Government and its agencies/ public enterprises etc. but **also for procurement by State Governments and their agencies/ public enterprises etc. No fresh registration at the State level shall be required.**

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- I. The Competent Authority is empowered to cancel the registration already granted if it determines that there is sufficient cause. Such cancellation by itself, however, will not affect the execution of contracts already awarded. Pending cancellation, it may also suspend the registration of a bidder, and the bidder shall not be eligible to bid in any further tenders during the period of suspension.
- J. For national security reasons, the Competent Authority shall not be required to give reasons for rejection / cancellation of registration of a bidder.
- K. In transitional cases falling under para 3 of this Order, where it is felt that it will not be practicable to exclude bidders from a country which shares a land border with India, a reference seeking permission to consider such bidders shall be made by the procuring entity to the Competent Authority, giving full information and detailed reasons. The Competent Authority shall decide whether such bidders may be considered, and if so shall follow the procedure laid down in the above paras.
- L. Periodic reports on the acceptance/ refusal of registration during the preceding period may be required to be sent to the Cabinet Secretariat. Details will be issued separately in due course by DPIIT.

[\*Note:

- i. In respect of application of this Order to procurement by/ under State Governments, all functions assigned to DPIIT shall be carried out by the State Government concerned through a specific department or authority designated by it. The composition of the Registration Committee shall be as decided by the State Government and paragraph G above shall not apply. However, the requirement of **political and security clearance as per para D shall remain and no registration shall be granted without such clearance.**
- ii. Registration granted by State Governments shall be valid only for procurement by the State Government and its agencies/ public enterprises etc. and shall not be valid for procurement in other states or by the Government of India and their agencies/ public enterprises etc.]

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## Annex II: Special Cases

- A. Till 31<sup>st</sup> December 2020, procurement of medical supplies directly related to containment of the Covid-19 pandemic shall be exempt from the provisions of this Order.
- B. *Bona fide* procurements made through GeM without knowing the country of the bidder till the date fixed by GeM for this purpose, shall not be invalidated by this Order.
- C. *Bona fide* small procurements, made without knowing the country of the bidder, shall not be invalidated by this Order.
- D. In projects which receive international funding with the approval of the Department of Economic Affairs (DEA), Ministry of Finance, the procurement guidelines applicable to the project shall normally be followed, notwithstanding anything contained in this Order and without reference to the Competent Authority. Exceptions to this shall be decided in consultation with DEA.
- E. This Order shall not apply to procurement by Indian missions and by offices of government agencies/ undertakings located outside India.

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### **Annex III**

#### **Model Clause /Certificate to be inserted in tenders etc.**

*(While adhering to the substance of the Order, procuring entities and GeM are free to appropriately modify the wording of the clause/ certificate based on their past experience, local needs etc.)*

#### **Model Clauses for Tenders**

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
- II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -
  - a. An entity incorporated, established or registered in such a country; or
  - b. A subsidiary of an entity incorporated, established or registered in such a country; or
  - c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
  - d. An entity whose *beneficial owner* is situated in such a country; or
  - e. An Indian (or other) agent of such an entity; or
  - f. A natural person who is a citizen of such a country; or
  - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- IV. The *beneficial owner* for the purpose of (iii) above will be as under:
  1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation—

    - a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

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- b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;
  3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
  4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
  5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.
- V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.
- VI. *[To be inserted in tenders for Works contracts, including Turnkey contracts]* The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Model Certificate for Tenders (for transitional cases as stated in para 3 of this Order)

*"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I hereby certify that this bidder is not from such a country and is eligible to be considered."*

Model Certificate for Tenders

*"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the*

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*Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]”*

Model Certificate for Tenders for Works involving possibility of sub-contracting

*“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]”*

Model Certificate for GeM:

*“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this vendor/ bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this vendor/ bidder fulfills all requirements in this regard and is eligible to be considered for procurement on GeM. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]”*

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**On Bidder Letter Head**

Date:

To,

M/s Bharat Heavy Electricals Ltd.  
Electronics Division, Mysore Road,  
Bangalore – 560026

Sub: Model Clause / Certificate as per Annex-III (Tenders) of Restrictions Under Rule 144 (xi) of the  
General Financial Rules (GFRs) 2017, Dated 23.07.2020.

Ref: BHEL Tender / RFQ / NIT Number .....

I (authorized signatory for M/s ..... ) have read the clause  
regarding restrictions on procurement from a bidder of a country which shares a land border with India ,  
we certify that this bidder M/s ..... [Vendor Name & address] is not from such a country  
or , if from such a country , has been registered with the competent authority . We hereby certify that  
we fulfill all requirements in this regard and is eligible to be considered [attach evidence of valid  
registration certificate with competent authority].

For M/s .....

Authorized Signatory  
(With company seal & Name)

No. P-45021/2/2017-PP (BE-II)  
Government of India  
Ministry of Commerce and Industry  
Department for Promotion of Industry and Internal Trade  
(Public Procurement Section)

Udyog Bhawan, New Delhi  
Dated: 16<sup>th</sup> September, 2020

To

All Central Ministries/Departments/CPSUs/All concerned

**ORDER**

**Subject: Public Procurement (Preference to Make in India), Order 2017– Revision; regarding.**

Department for Promotion of Industry and Internal Trade, in partial modification [Paras 2, 3, 5, 10 & 13] of Order No.P-45021/2/2017-B.E.-II dated 15.6.2017 as amended by Order No.P-45021/2/2017-B.E.-II dated 28.05.2018, Order No.P-45021/2/2017-B.E.-II dated 29.05.2019 and Order No.P-45021/2/2017-B.E.-II dated 04.06.2020, hereby issues the revised 'Public Procurement (Preference to Make in India), Order 2017' dated 16.09.2020 effective with immediate effect.

**Whereas** it is the policy of the Government of India to encourage 'Make in India' and promote manufacturing and production of goods and services in India with a view to enhancing income and employment, and

**Whereas** procurement by the Government is substantial in amount and can contribute towards this policy objective, and

**Whereas** local content can be increased through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them,

**Now therefore the following Order is issued:**

1. This Order is issued pursuant to Rule 153 (iii) of the General Financial Rules 2017.
2. **Definitions:** For the purposes of this Order:

*'Local content'* means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

*'Class-I local supplier'* means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

.....Contd. p/2

*'Class-II local supplier'* means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for 'Class-I local supplier' under this Order.

*'Non - Local supplier'* means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

*'L1'* means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

*'Margin of purchase preference'* means the maximum extent to which the price quoted by a "Class-I local supplier" may be above the L1 for the purpose of purchase preference.

*'Nodal Ministry'* means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

*'Procuring entity'* means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

*'Works'* means all works as per Rule 130 of GFR- 2017, and will also include *'turnkey works'*.

### **3. Eligibility of 'Class-I local supplier' / 'Class-II local supplier' / 'Non-local suppliers' for different types of procurement**

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by sub-para 3(a) above, and with estimated value of purchases less than Rs. 200 Crore, in accordance with Rule 161(iv) of GFR, 2017, Global tender enquiry shall not be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

### 3A. Purchase Preference

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) above and which are divisible in nature, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.
- ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) above and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1.
- ii. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
- iii. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

- (d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.

**3B. Applicability in tenders where contract is to be awarded to multiple bidders -**

In tenders where contract is awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- a) In case there is sufficient local capacity and competition for the item to be procured, as notified by the nodal Ministry, only Class I local suppliers shall be eligible to bid. As such, the multiple suppliers, who would be awarded the contract, should be all and only 'Class I Local suppliers'.
- b) In other cases, 'Class II local suppliers' and 'Non local suppliers' may also participate in the bidding process along with 'Class I Local suppliers' as per provisions of this Order.
- c) If 'Class I Local suppliers' qualify for award of contract for at least 50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class I Local suppliers' do not qualify for award of contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class I local supplier' over 'Class II local suppliers' / 'Non local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class I Local suppliers' taken in totality are considered for award of contract for at least 50% of the tendered quantity.
- d) First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference, subject to its meeting the prescribed criteria for award of contract as also the constraint of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier', falling within 20% margin of purchase preference, and so on.
- e) To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulated in sub-paras above.

4. **Exemption of small purchases:** Notwithstanding anything contained in paragraph 3, procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

5. **Minimum local content:** The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the 'local content' requirement is minimum 20%. Nodal Ministry/ Department may prescribe only a higher

percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/ 'Class-II local supplier'. For the items, for which Nodal Ministry/ Department has not prescribed higher minimum local content notification under the Order, it shall be 50% and 20% for 'Class-I local supplier'/ 'Class-II local supplier' respectively.

6. **Margin of Purchase Preference:** The margin of purchase preference shall be 20%.
7. **Requirement for specification in advance:** The minimum local content, the margin of purchase preference and the procedure for preference to Make in India shall be specified in the notice inviting tenders or other form of procurement solicitation and shall not be varied during a particular procurement transaction.
8. **Government E-marketplace:** In respect of procurement through the Government E-marketplace (GeM) shall, as far as possible, specifically mark the items which meet the minimum local content while registering the item for display, and shall, wherever feasible, make provision for automated comparison with purchase preference and without purchase preference and for obtaining consent of the local supplier in those cases where purchase preference is to be exercised.
9. **Verification of local content:**
  - a. The 'Class-I local supplier'/ 'Class-II local supplier' at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for 'Class-I local supplier'/ 'Class-II local supplier', as the case may be. They shall also give details of the location(s) at which the local value addition is made.
  - b. In cases of procurement for a value in excess of Rs. 10 crores, the 'Class-I local supplier'/ 'Class-II local supplier' shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
  - c. Decisions on complaints relating to implementation of this Order shall be taken by the competent authority which is empowered to look into procurement-related complaints relating to the procuring entity.
  - d. Nodal Ministries may constitute committees with internal and external experts for independent verification of self-declarations and auditor's/ accountant's certificates on random basis and in the case of complaints.
  - e. Nodal Ministries and procuring entities may prescribe fees for such complaints.
  - f. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

- g. A supplier who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, in the manner prescribed under paragraph 9h below.
- h. The Department of Expenditure shall issue suitable instructions for the effective and smooth operation of this process, so that:
  - i. The fact and duration of debarment for violation of this Order by any procuring entity are promptly brought to the notice of the Member-Convenor of the Standing Committee and the Department of Expenditure through the concerned Ministry /Department or in some other manner;
  - ii. on a periodical basis such cases are consolidated and a centralized list or decentralized lists of such suppliers with the period of debarment is maintained and displayed on website(s);
  - iii. in respect of procuring entities other than the one which has carried out the debarment, the debarment takes effect prospectively from the date of uploading on the website(s) in the such a manner that ongoing procurements are not disrupted.

**10. Specifications in Tenders and other procurement solicitations:**

- a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.
- b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier'/ 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.
- c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.

**d. Reciprocity Clause**

- i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of barring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc., it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.

- ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all items related to that nodal Ministry/ Department, except for the list of items published by the Ministry/ Department permitting their participation.
  - iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchases on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/ Department.
  - iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.
  - v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.
- e. Specifying foreign certifications/ unreasonable technical specifications/ brands/ models in the bid document is restrictive and discriminatory practice against local suppliers. If foreign certification is required to be stipulated because of non-availability of Indian Standards and/or for any other reason, the same shall be done only after written approval of Secretary of the Department concerned or any other Authority having been designated such power by the Secretary of the Department concerned.
- f. "All administrative Ministries/Departments whose procurement exceeds Rs. 1000 Crore per annum shall notify/ update their procurement projections every year, including those of the PSEs/PSUs, for the next 5 years on their respective website."

**10A. Action for non-compliance of the Provisions of the Order:** In case restrictive or discriminatory conditions against domestic suppliers are included in bid documents, an inquiry shall be conducted by the Administrative Department undertaking the procurement (including procurement by any entity under its administrative control) to fix responsibility for the same. Thereafter, appropriate action, administrative or otherwise, shall be taken against erring officials of procurement entities under relevant provisions. Intimation on all such actions shall be sent to the Standing Committee.

**11. Assessment of supply base by Nodal Ministries:** The Nodal Ministry shall keep in view the domestic manufacturing / supply base and assess the available capacity and the extent of local competition while identifying items and prescribing the higher minimum local content or the manner of its calculation, with a view to avoiding cost increase from the operation of this Order.

**12. Increase in minimum local content:** The Nodal Ministry may annually review the local content requirements with a view to increasing them, subject to availability of sufficient local competition with adequate quality.

13. **Manufacture under license/ technology collaboration agreements with phased indigenization:** While notifying the minimum local content, Nodal Ministries may make special provisions for exempting suppliers from meeting the stipulated local content if the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for indigenous manufacture of a product developed abroad with clear phasing of increase in local content.

13A. In procurement of all goods, services or works in respect of which there is substantial quantity of public procurement and for which the nodal ministry has not notified that there is sufficient local capacity and local competition, the concerned nodal ministry shall notify an upper threshold value of procurement beyond which foreign companies shall enter into a joint venture with an Indian company to participate in the tender. Procuring entities, while procuring such items beyond the notified threshold value, shall prescribe in their respective tenders that foreign companies may enter into a joint venture with an Indian company to participate in the tender. The procuring Ministries/Departments shall also make special provisions for exempting such joint ventures from meeting the stipulated minimum local content requirement, which shall be increased in a phased manner.

14. **Powers to grant exemption and to reduce minimum local content:** The administrative Department undertaking the procurement (including procurement by any entity under its administrative control), with the approval of their Minister-in-charge, may by written order, for reasons to be recorded in writing,

- a. reduce the minimum local content below the prescribed level; or
- b. reduce the margin of purchase preference below 20%; or
- c. exempt any particular item or supplying entities from the operation of this Order or any part of the Order.

A copy of every such order shall be provided to the Standing Committee and concerned Nodal Ministry / Department. The Nodal Ministry / Department concerned will continue to have the power to vary its notification on Minimum Local Content.

15. **Directions to Government companies:** In respect of Government companies and other procuring entities not governed by the General Financial Rules, the administrative Ministry or Department shall issue policy directions requiring compliance with this Order.

16. **Standing Committee:** A standing committee is hereby constituted with the following membership:

Secretary, Department for Promotion of Industry and Internal Trade—Chairman  
Secretary, Commerce—Member  
Secretary, Ministry of Electronics and Information Technology—Member  
Joint Secretary (Public Procurement), Department of Expenditure—Member  
Joint Secretary (DPIIT)—Member-Convenor

The Secretary of the Department concerned with a particular item shall be a member in respect of issues relating to such item. The Chairman of the Committee may co-opt technical experts as relevant to any issue or class of issues under its consideration.

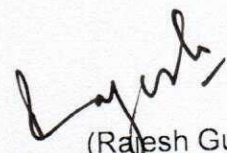
**17. Functions of the Standing Committee:** The Standing Committee shall meet as often as necessary, but not less than once in six months. The Committee

- a. shall oversee the implementation of this order and issues arising therefrom, and make recommendations to Nodal Ministries and procuring entities.
- b. shall annually assess and periodically monitor compliance with this Order
- c. shall identify Nodal Ministries and the allocation of items among them for issue of notifications on minimum local content
- d. may require furnishing of details or returns regarding compliance with this Order and related matters
- e. may, during the annual review or otherwise, assess issues, if any, where it is felt that the manner of implementation of the order results in any restrictive practices, cartelization or increase in public expenditure and suggest remedial measures
- f. may examine cases covered by paragraph 13 above relating to manufacture under license/ technology transfer agreements with a view to satisfying itself that adequate mechanisms exist for enforcement of such agreements and for attaining the underlying objective of progressive indigenization
- g. may consider any other issue relating to this Order which may arise.

**18. Removal of difficulties:** Ministries /Departments and the Boards of Directors of Government companies may issue such clarifications and instructions as may be necessary for the removal of any difficulties arising in the implementation of this Order.

**19. Ministries having existing policies:** Where any Ministry or Department has its own policy for preference to local content approved by the Cabinet after 1<sup>st</sup> January 2015, such policies will prevail over the provisions of this Order. All other existing orders on preference to local content shall be reviewed by the Nodal Ministries and revised as needed to conform to this Order, within two months of the issue of this Order.

**20. Transitional provision:** This Order shall not apply to any tender or procurement for which notice inviting tender or other form of procurement solicitation has been issued before the issue of this Order.



(Rajesh Gupta)  
Director

Tel: 23063211

[rajesh.gupta66@gov.in](mailto:rajesh.gupta66@gov.in)

SELF CERTIFICATION ON LETTERHEAD OF BIDDER (Make In India)

we hereby certify that

.....

(supplier name) are local supplier meeting requirement of

(i) local content (50%) and above for the material against Enquiry No.

(ii) Local content (>20% and <50%) for the material against Enquiry No.

(strike off the above condition not applicable for you)

TGPBOS0056 dtd. 04.03.2021 for Supply and I&C of BOS package for 100MW GSECL-Raghanesda 2 Solar Power project

Details of location at which local value addition will be made is as follows:

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We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Seal and Signature of Authorized  
signatory with date

## MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES

## NOTIFICATION

New Delhi, the 26th June, 2020

**S.O. 2119(E).**—In exercise of the powers conferred by sub-section (1) read with sub-section (9) of section 7 and sub-section (2) read with sub-section (3) of section 8, of the Micro, Small and Medium Enterprises Development Act, 2006, (27 of 2006), hereinafter referred to as the said Act, and in supersession of the notifications of the Government of India in the Ministry of Micro, Small and Medium Enterprises number S.O.1702 (E ), dated the 1<sup>st</sup> June, 2020, S.O. 2052 (E), dated the 30<sup>th</sup> June, 2017, S.O.3322 (E ), dated the 1<sup>st</sup> November, 2013 and S.O.1722 (E ), dated the 5<sup>th</sup> October, 2006, published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-Section (ii), except as respects things done or omitted to be done before such supersession, the Central Government, after obtaining the recommendations of the Advisory Committee in this behalf, hereby notifies certain criteria for classifying the enterprises as micro, small and medium enterprises and specifies the form and procedure for filing the memorandum (hereafter in this notification to be known as “Udyam Registration”), with effect from the 1<sup>st</sup> day of July, 2020, namely:--

**1. Classification of enterprises.**—An enterprise shall be classified as a micro, small or medium enterprise on the basis of the following criteria, namely:--

- (i) a micro enterprise, where the investment in plant and machinery or equipment does not exceed one crore rupees and turnover does not exceed five crore rupees;
- (ii) a small enterprise, where the investment in plant and machinery or equipment does not exceed ten crore rupees and turnover does not exceed fifty crore rupees; and
- (iii) a medium enterprise, where the investment in plant and machinery or equipment does not exceed fifty crore rupees and turnover does not exceed two hundred and fifty crore rupees.

**2. Becoming a micro, small or medium enterprise.--**

- (1) Any person who intends to establish a micro, small or medium enterprise may file Udyam Registration online in the Udyam Registration portal, based on self-declaration with no requirement to upload documents, papers, certificates or proof.
- (2) On registration, an enterprise (referred to as “Udyam” in the Udyam Registration portal) will be assigned a permanent identity number to be known as “Udyam Registration Number”.
- (3) An e-certificate, namely, “Udyam Registration Certificate” shall be issued on completion of the registration process.

**3. Composite criteria of investment and turnover for classification.--**

- (1) A composite criterion of investment and turnover shall apply for classification of an enterprise as micro, small or medium.
- (2) If an enterprise crosses the ceiling limits specified for its present category in either of the two criteria of investment or turnover, it will cease to exist in that category and be placed in the next higher category but no enterprise shall be placed in the lower category unless it goes below the ceiling limits specified for its present category in both the criteria of investment as well as turnover.
- (3) All units with Goods and Services Tax Identification Number (GSTIN) listed against the same Permanent Account Number (PAN) shall be collectively treated as one enterprise and the turnover and investment figures for all of such entities shall be seen together and only the aggregate values will be considered for deciding the category as micro, small or medium enterprise.

**4. Calculation of investment in plant and machinery or equipment.--**

- (1) The calculation of investment in plant and machinery or equipment will be linked to the Income Tax Return (ITR) of the previous years filed under the Income Tax Act, 1961.

|                     |   |                                                                        |  |  |  |
|---------------------|---|------------------------------------------------------------------------|--|--|--|
| RFQ/NIT/Enquiry no. | : | TGPBOS0056                                                             |  |  |  |
| Description         | : | Supply and I&C for BOS package for 100MW Raghnesda 2 solar PV project. |  |  |  |

| TECHNO COMMERCIAL |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                          |                     |
|-------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|
| Sr. No            | DESCRIPTION                | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RESPONSE(AGREE/DISAGREE) | Remarks if disagree |
| 1                 | TENDER TYPE                | THIS TENDER IS NOT A GLOBAL TENDER. THE TENDER IS INDIGENEOUS OPEN TENDER . PLEASE REFER TENDER DOCUMENTS FOR DETAILED TERMS AND CONDITIONS APPLICABLE FOR THE TENDER.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                     |
| 2                 | Price Basis                | Firm i.e., from the date of PO to completion of supply if I&C is not applicable. If I&C is in supplier's scope, then the prices shall remain Firm till commissioning & handing-over of the complete system. (PVC clause not acceptable).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                     |
| 3                 | Terms of Delivery          | FOR INDIGENOUS VENDORS: Free On Road Basis to GSECL 100MW Raghnesda-02 Solar PV plant.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                     |
| 4                 | Delivery Period            | Supply: 6 weeks from date of drawing approval.<br>I&C: 6 weeks from date of supply.<br>GTP/DRG submission: within 1 week from date of PO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                     |
| 5                 | Payment Term               | a. 80% of basic supply value+100% taxes and freight charges will be paid with 45 days credit from the receipt of material at site or 15 days credit from the date of submission of complete set of documentation whichever is later. b. 10% of basic supply value will be paid on completion of I&C against submission of supplementary invoice with proof of completion of I&C along with I&C charges (if Any). c. Balance 10% (retention money) against submission of supplementary invoice along with PBG valid for Warranty Period+ 3 months claim period from BHEL Consortium Bank d. I&C/Supervision: 100% on completion of I&C/Supervision and certification line item wise on prorata basis with 15 days credit from the date of submission of complete set of documentation. Note: In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice & Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period. |                          |                     |
| 6                 | Payment Term               | (b) For any deviation in payment term, the offer will be liable for loading as per Clause G of ITB. If loading not acceptable, offer will be outrightly rejected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                     |
| 7                 | Evaluation of L1 vendor    | Evaluation to be done on package wise, L1 for Supply on FOR destination basis to site will only be considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                          |                     |
| 8                 | Warranty                   | Warranty for Supply : 18 months from supply OR 12 months from I&C whichever is earlier.<br>Warranty for I&C: 12 months from I&C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |                     |
| 9                 | Pre Shipment Inspection    | (a) Pre Shipment Inspection will be carried out by BHEL/Customer for which test report shall be sent at least one week in advance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |                     |
| 10                | Pre Shipment Inspection    | (b) Pre Shipment Inspection charges , if any, shall be considered while evaluating your offer to arrive at "Total Cost to BHEL". The charges for the same shall be informed to you before Price Bid Opening.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                          |                     |
| 11                | Penalty                    | (a) Supply: Penalty of 0.5% per week at the basic price of the good for undelivered quantity of supply portion, subject to a maximum of 10%. For Supply, Pre Shipment Inspection Call Letter Date (Receipt of test report) will be treated as delivery for purpose of penalty. In case PSI call given without test report, then actual date of inspection only will be considered as date of delivery for purpose of penalty calculation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                     |
| 12                | Penalty                    | ( b) For any deviation in penalty term, the offer will be liable for loading as per Clause No. G, Point No.(b) of ITB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |                     |
| 13                | E-way bill                 | E-way bill if applicable will be given by BHEL before Dispatch of ordered Items. However, vendor shall give request for road permit 24 hours in advance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                     |
| 14                | Performance Bank Guarantee | PBG to be furnished for 10% of the basic value valid for Warranty period+3 months claim period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                          |                     |

|    |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 15 | Despatch Documents                                                                                                                                                                                                                                            | Complete set of despatch documents in 3 sets shall be forwarded to BHEL directly. Despatch documents include 1.Invoice 2 copies in original 2.Packing List 3.Delivery challan 4.Original receipted LR 5.Copy of Inspection call letter issued by vendor to BHEL along with internal test reports/certificates. 6.Warranty Certificate as per PO 7.Dispatch clearance certificate issued by BHEL to vendor 8.Material Receipt Certificate issued by BHEL site. 9.Copy of manufacturing clearance or document approval e-mail issued by BHEL. 10.Inspection MOM with test reports/test certificate 11.Subvendor packing list/Invoice (If applicable) 12.copy of way bill generated 13.Bank guarantee 14.Copy of order acknowledgement for having received PO. 15.Copy of Insurance intimation fax/e-mail/letter 16.â€œNILâ€š short-shipment certificate. |  |  |
| 16 | PRICE BID OPENING                                                                                                                                                                                                                                             | L1 shall be arrived at by opening of price bids alone. No Reverse Auction will be conducted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| 17 | Other terms & conditions                                                                                                                                                                                                                                      | For detailed Terms and Conditions, kindly refer to the following: A: ITB B: GCC . Any Deviations from or additions to the "General Conditions of Contract" or "Special Conditions of Contract" require BHEL's express written consent. The General Terms of Business or Sale of the Bidder shall not apply to this tender.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |
| 18 | Validity                                                                                                                                                                                                                                                      | Quotation should remain valid for a period of 90 days from the due date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |
| 19 | Shipment                                                                                                                                                                                                                                                      | Kindly indicate the state from where the shipment will take place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| 20 | Bank charges                                                                                                                                                                                                                                                  | All Bank charges to seller's account.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| 21 | Consignment Details                                                                                                                                                                                                                                           | Weight and Dimension of consignment with packing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |
| 22 | Insurance                                                                                                                                                                                                                                                     | Insurance is in BHEL scope.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |
| 23 | Pre Qualification Criteria Documents Submitted                                                                                                                                                                                                                | indicated in NIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |
| 24 | Changes in tender condition                                                                                                                                                                                                                                   | Any changes in the specification, terms & conditions etc or in splitting ratio based on the MSE act /Make in India policy or due to any other reason, intimation will be given only to the vendors who have participated in this tender, hence it is mandatory that vendors should participate in the tender.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |
| 25 | Unloading                                                                                                                                                                                                                                                     | unloading at site is under scope of vendor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |
| 26 | Declaration required under Rule 144(xi) of General Financial Rules, 2017 amendment dt 23.07.2020 issued by Ministry of Finance, Govt. of India.Refer Annexure-X for Restrictions under Rule 144(Xi) of General Financial Rules, 2017 amendment dt:23.07.2020. | The Bidder shall mandatorily submit Declaration as per format enclosed as part of tender(ANNEXURE-14)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| 27 | MSE status(Applicable for MSE vendors only)                                                                                                                                                                                                                   | Documents to be submitted for claiming MSE status:<br>Option 1(valid till 31.03.2021):submission of Udyog Aadhar Memorandum along with CA certificate as per ANNEXURE VIII of NIT.<br>Option 2:Submission of Udyam Registration certificate.<br>Latest MSE guidelines and circulars with subsequent amendments or clarifications (if any) will be applicable for this tender.Please refer NIT for MSE guidelines.                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |
| 28 | Tax regime and introduction of Sec206C(1H) on sale of goods                                                                                                                                                                                                   | Please note that with the recent changes in Tax regime and introduction of Sec206C(1H) on sale of goods with effect from 01.10.2020 the vendors in line with the provisions of the said section are to collect TCS @0.075%from 01.10.2020 upto 31.03.2021 and 0.1% from there on Invoice value.(a).Vendor should raise /levy TCS in the Tax Invoice itself. No separate debit note will be accepted.(b).Vendor should indicate his Pan# and Tan # in the Tax invoice.(c).Vendor should remit the TCS so collected from BHEL and provide TCS certificates with invoice no., invoice date, Amount etc. breakup details.(d).If by any chance vendor is not remitting /not able to submit TCS certificates to BHEL on time then the TCS amount with penalty if any applicable will be recovered from vendor in his available bills.                        |  |  |

|    |                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
|----|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 29 | Preference to make in India order2017 dated 16.09.2020 | Government circular for Preference to make in India order2017 dated 16.09.2020 and subsequent amendments(if any) shall be applicable for this tender.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |
| 30 | Mandatory GeM registration ID for vendor               | Government E-Marketplace(GeM) registration ID of vendor is mandatory for placement of purchase order. Vendor has to register in GeM portal and inform GeM registration ID before placement of purchase order. If GeM registration ID is not provided by vendor before PO placement, vendor is not eligible for placement of purchase order.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |
| 31 | Evaluation currency                                    | Evaluation currency for this tender shall be INR.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| 32 | E-Invoice                                              | E-invoicing under GST is being implemented w.e.f. 1st October 2020 for all the taxable person having turnover more than Rs. 500 Crore. It has been specified by the Govt that it is mandatory to mention a valid unique Invoice reference number (IRN) and QR code as generated from Govt. portal on a Tax invoice. Based on such information, GST ITC as claimed by BHEL in GST Returns shall be matched with the corresponding details uploaded by supplied in E-invoicing system. 2. In case the vendor delays or fails to provide all the documents as per the Purchase order at the time of submitting Tax invoice to BHEL, any subsequent financial loss to BHEL on account of vendor shall be to vendor's account. BHEL has further right to take necessary steps to protect its interest at the time of release of payment |  |  |

## UNPRICED BID

|             |   |                                                                        |                            |   |            |
|-------------|---|------------------------------------------------------------------------|----------------------------|---|------------|
|             |   |                                                                        | RFQ/NIT/<br>Enquiry<br>no. | : | TGPBOS0056 |
| Description | : | Supply and I&C for BOS package for 100MW Raghnesda 2 solar PV project. |                            |   |            |

| UNPRICE BID |               |                                                    |     |      |                         |                 |                      |          |              |
|-------------|---------------|----------------------------------------------------|-----|------|-------------------------|-----------------|----------------------|----------|--------------|
| Sl. No      | Material Code | Description                                        | Qty | Unit | WETHER QUOTED<br>OR NOT | HSN/SAC<br>CODE | GST<br>INDICATE<br>D | GS<br>T% | CURRE<br>NCY |
| 1           | PS0679082930  | Supply of MC4 connectors,cable ties<br>etc         | 1   | ST   |                         |                 |                      |          | INR          |
| 2           | PS0679082948  | Supply of LT,Contrl/instrumentation<br>cables      | 1   | ST   |                         |                 |                      |          | INR          |
| 3           | PS0679082956  | Supply of UPS,FCBC,ACDB,UPS DB<br>etc              | 1   | ST   |                         |                 |                      |          | INR          |
| 4           | PS0679082964  | Supply of earthing items                           | 1   | ST   |                         |                 |                      |          | INR          |
| 5           | PS0679082972  | Supply of lightning arrestors.                     | 1   | ST   |                         |                 |                      |          | INR          |
| 6           | PS0679082980  | supply of items for plant lighting                 | 1   | ST   |                         |                 |                      |          | INR          |
| 7           | PS0679082999  | Supply of miscellaneous items                      | 1   | ST   |                         |                 |                      |          | INR          |
| 8           | PS0679083006  | Supply of CCTV system                              | 1   | ST   |                         |                 |                      |          | INR          |
| 9           | PS0679083014  | Supply of safety related items.                    | 1   | ST   |                         |                 |                      |          | INR          |
| 10          | PS0679083022  | Supply of spare items                              | 1   | ST   |                         |                 |                      |          | INR          |
| 11          | PS0679083030  | Supply of electrical utility items                 | 1   | ST   |                         |                 |                      |          | INR          |
| 12          | PS0679083049  | I&C:Interconnection of SPV<br>modules.             | 1   | AU   |                         |                 |                      |          | INR          |
| 13          | PS0679083057  | I&C:Laying of DC cable from SCB to<br>PCU          | 1   | AU   |                         |                 |                      |          | INR          |
| 14          | PS0679083065  | I&C:Installation of equipment                      | 1   | AU   |                         |                 |                      |          | INR          |
| 15          | PS0679083073  | I&C:laying of AC cables from PCU to<br>transformer | 1   | AU   |                         |                 |                      |          | INR          |
| 16          | PS0679083081  | I&C:Laying and termination of HT<br>cables.        | 1   | AU   |                         |                 |                      |          | INR          |
| 17          | PS0679083090  | I&C: SCADA installation.                           | 1   | AU   |                         |                 |                      |          | INR          |
| 18          | PS0679083103  | I&C:Earthing.                                      | 1   | AU   |                         |                 |                      |          | INR          |
| 19          | PS0679083111  | I&C:Installation of Miscellaneous<br>items         | 1   | AU   |                         |                 |                      |          | INR          |
| 20          | PS0679083120  | I&C:Installation of lighting system                | 1   | AU   |                         |                 |                      |          | INR          |
| 21          | PS0679083138  | I&C:Precommissioning tests &<br>Commissioning      | 1   | AU   |                         |                 |                      |          | INR          |

| Vendor Bid Form     |                                                                  |
|---------------------|------------------------------------------------------------------|
| RFQ/NIT/Enquiry no. | TGPBOS0056                                                       |
| Description         | Supply and I&C of BOS package for Raghanesda 2 solar PV project. |

| Sr. No | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | VENDOR TO FILL THE DETAILS |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | RESPONSE                   |
| 1      | VENDOR NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                            |
| 2      | OFFICE ADDRESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| 3      | WORKS ADDRESS (1,2 etc if any)                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| 4      | Order to be Placed on, Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| 5      | CONTACT PERSON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| 6      | TELE, MOBILE NO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |
| 7      | FIRM MAIL IDs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |
| 8      | GST NO, scanned copy (mandatory document). <b>To be attached under "Commercial documents,certificates and forms" packet cover ref:2020_BHEL_134_pack1_440 of NIT</b>                                                                                                                                                                                                                                                                                                                                         |                            |
| 9      | PAN NO, scanned copy(mandatory document). <b>To be attached under "Commercial documents,certificates and forms" packet cover ref:2020_BHEL_134_pack1_440 of NIT</b>                                                                                                                                                                                                                                                                                                                                          |                            |
| 10     | BANK AND BRANCH NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                            |
| 11     | BANK ACCOUNT NO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |
| 12     | MSE VENDOR / NON MSE VENDOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                            |
| 13     | Vendor to submit the MSE documents as per ITB/GCC/SCC along with UAM no/Udyam Registration . In case of non-submission, vendor will be treated at par with non-MSE vendors (Mandatory document). <b>To be attached under "Commercial documents,certificates and forms" packet cover ref:2020_BHEL_134_pack1_440 of NIT</b>                                                                                                                                                                                   |                            |
| 14     | ORIGIN OF DISPATCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                            |
| 15     | QUOTATION REFERENCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |
| 16     | QUOTATION DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| 17     | Preference to make in India order 2017 dated 16.09.2020. Submit certificate as per ANNEXURE-14 . <b>To be attached under "Commercial documents,certificates and forms" packet cover ref:2020_BHEL_134_pack1_440 of NIT</b>                                                                                                                                                                                                                                                                                   |                            |
| 18     | Declaration required under Rule 144(xi) of General Financial Rules, 2017 amendment dt 23.07.2020 issued by Ministry of Finance, Govt. of India. Refer Annexure-X for Restrictions under Rule 144(Xi) of General Financial Rules, 2017 amendment dt:23.07.2020.<br><b>The Bidder shall mandatorily submit Declaration as per format enclosed as part of tender(ANNEXURE-13).</b><br><b>To be attached under "Commercial documents,certificates and forms" packet cover ref:2020_BHEL_134_pack1_440 of NIT</b> |                            |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 19 | <p>The bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.</p> <p>In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/guidelines.</p> |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|