SECTION – 1

General Technical Specification - VRFB

1.0.0 INTENT OF SPECIFICATION

1.1.0 The specification covers the requirement of design, engineering, manufacture, assembly, inspection, painting at manufacturer's works, packing and forwarding, transportation to site, unloading, storage at site, assembly, erection, final checkup, site testing and commissioning of 20MW/120MWh Battery Energy Storage System (BESS) in GIPCL'S 165MW Gas Power plant in Vadodara.

1.2.0 It is not intended to specify completely herein all details of design and manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to agreed guarantee.

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

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

1.5.0 The work to be carried out shall be all in accordance with the requirements, conditions, appendices etc. given in Technical Specifications together with those stated in other Parts/ Sub-Parts/tender drawings of Bid Documents which shall be considered as a part of this volume as completely as if bound herewith.

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

1.7.0 In case of any conflicts / contradiction among various clauses / Parts / Appendix / Annexure/chapters / appendices / tender drawings of bid documents, the most stringent

requirement shall govern; decision of the Owner shall always be final & binding on the Bidder/Successful bidder. No claims shall be allowed on this account.

1.8.0 The scope of the bidder includes complete design and engineering, technical co-ordination (including participation and arranging technical co-ordination meetings), finalization of drawings/ documents, submission of engineering drawing / documents and processing of their approvals by the Owner.

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

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

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

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

1.13.0 The drawings enclosed with the specification indicate the minimum requirement and all bidders shall comply with it. Any further improvement required during detailed engineering and execution shall also be implemented by bidder. Bidder shall confirm that the type, make, model of all bought out items supplied by the bidder under the specification shall be subject to the approval of the Owner during detailed engineering stage.

2.0.0 SCOPE OF WORK

2.1.0 The scope of work covers the design requirements for a standalone, grid-connected 20MW/120MWh Battery Energy Storage System (BESS) located within and around the GIPCL existing 165 MW gas-based power plant complex.

2.2.0 The broad scope of work shall be for the development of a grid-connected 20 MW / 120 MWh Vanadium Redox Flow Battery Energy Storage System and all related Balance of System (BOS) components on a full turnkey EPC basis comprising:

2.3.0 Design, Engineering, Supply, Packing & Forwarding, Transportation, Unloading, Storage, Construction, Erection, Testing, and Commissioning

2.4.0 Interfacing of new BESS with existing systems within the GIPCL plant complex including but not limited to following removal, replacement, maintenance, required integration and modification work

2.5.0 Integration of BESS system with existing power evacuation system.

2.6.0 Necessary infrastructure for BESS system in the Plot B area and necessary places within the Baroda plant: internal roads, storm water drainage, street lighting, fencing, telecommunication, security systems.

2.7.0 Suitable interfacing at GETCO substation including removal, replacement, required integration and modification work as applicable.

2.8.0 The EPC scope covers Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning.

2.9.0 TEN (10) years of Comprehensive Operation & Maintenance (O&M).

2.10.0 The BESS LV system shall be connected to the 11 kV switchgear of the BESS yard through inverter duty transformers. Power from the BESS shall be routed via the 11 kV switchgear located in the Main Control Room (MCR) and subsequently stepped up to 132 kV through the existing 70 MVA power transformer. The system shall thereafter be connected to the 132 kV grid through the existing 132 kV switchyard, and power shall be evacuated to the Grid Substation via existing Transmission Line-3 and Line-4.

The electrical system design shall encompass all components and associated infrastructure, from the Vanadium Redox Flow Battery (VRFB) system up to the Point of Interconnection (POI), including all required interface works at the GETCO / STU / Grid Substation (GSS).

Bidder shall refer Conceptual Single Line Diagram (SLD) provided with this tender document.

2.11.0 Technical Parameters indicated in drawings and detailed technical specifications for equipment are minimum requirement. Actual rating shall be as per power system studies, electrical sizing calculations, civil design calculations conducted by bidder. Any change in parameter shall be at no cost to Owner.

2.12.0 Erection, testing & commissioning of Battery container, PCS shall be done by the bidder under the supervision of the Purchaser. However, Bidder shall still not be absolved of his responsibility of establishing the correctness of equipment at site.

2.13.0 The scope of supply shall also include the following:

- First fill of consumables, if any
- Spare parts required for successful commissioning.
- Mandatory Spares as stipulated in this tender.
- Special tools for operation & maintenance (O&M) as stipulated in this tender.

2.14.0 The item-wise price of all these items shall be given by the bidder in the relevant schedule..

2.15.0 Mandatory spares and special tools & tackles being purchased by the Owner shall not be used during the commissioning of the equipment. Any spares and special tools and tackles required for commissioning purposes shall be in the scope of the Bidder.

2.16.0 Scope of Services in general shall include the following for overall System:

- Collection of all sites related data including existing system
- Submission of Quality Plans for approval
- Submission of progress report
- Overall co-ordination with internal / external agencies
- Civil work such as design and construction of foundation, cable trenches, firewall, oil pit etc.
- Unloading, storage, erection, testing & commissioning
- Adherence to Safety regulations including but not limited to obtaining safety permits to work, provision of suitable PPE kits to workers and supervision of Safety process.
- Supervision of erection, testing & commissioning
- All necessary co-ordination with other vendors / Vendors on site
- Arrangement of all necessary clearances and approval by office of the concerned electrical inspector. /factory inspector/environment authority (GPCB/CPCB)
- Preparation and submission of all as-built drawings in soft and hard copies including existing equipment and system.
- Participation in project review / Technical Coordination meetings.
- Obtaining Purchaser's approval and written acceptance of satisfactory performance
- Training of Purchaser's personnel in O&M activities

2.17.0 The bidder shall fully familiarize himself with the site conditions. The bidders are advised to visit the site and acquaint themselves including associated existing system.

2.18.0 Bidder shall provide training (free of cost) to GIPCL's personnel — minimum 15 man-days at Bidder's works and at site — covering erection, testing, commissioning, and O&M. Travel, lodging, and boarding expenses of GIPCL personnel shall be borne by GIPCL.

2.19.0 The successful bidder shall be fully responsible for providing all equipment, materials, system and services which are required to complete the construction and successful commissioning, operation and maintenance of the BESS plant in all respects.

2.20.0 The bidder shall obtain and pay for all permits, licenses and statutory approvals from local authorities for completion of work. Original copies of these approvals and money receipts shall be handed over to the Owner or his authorized representative. Statutory payments will be reimburse by GIPCL against submission of original receipts. .

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

2.22.0 All equipment shall be rated for continuous operation at the specified site conditions. Equipment shall be designed to provide a minimum service life of 25 years.

2.23.0 All electrical equipment's shall be suitable for operation on 50 Hz, 11 kV (Un earthed) , 415 V and 132 kV system with voltage variations of ±10% and frequency variation of ±5%.

2.24.0 All outdoor equipment shall be weatherproof and suitable for the outdoor conditions at the Vadodara site. Minimum IP54 for all outdoor enclosures; IP65 for electronic compartments.

2.25.0 All steel structures exposed to outdoor environment shall be galvanized to minimum 90 microns average thickness or painted to C4 corrosion protection standard.

2.26.0 Cable insulation, equipment enclosures, and all materials shall be FRLS (Flame Retardant Low Smoke) type wherever cables/wiring pass through enclosed spaces.

2.27.0 Comprehensive O&M (10 Years Post-Commissioning)- The scope includes, but is not limited to the following.

a. Maintaining BESS plant annual average availability at ≥ 95%.
b. Preventive maintenance as per OEM practices/system requirements/conditions.
c. Breakdown maintenance including all materials and services.
d. Annual testing of outage duration, power/dispatchable capacity, and RTE
e. Corrective actions (including installation of additional capacity if required) to restore performance to specification
f. Replacement/disposal of any BESS components during O&M period
g. Insurance of the BESS for the entire O&M period (in bidder's scope)
h. Compliance with DSM regulations; DSM penalties attributable to bidder are on bidder's account
i. The following performance parameters during O&M shall be maintained by the bidder.
    a. Zero annual capacity degradation throughout O&M — 100% deliverable capacity to be demonstrated at handover
    b. RTE ≥ 70% RTE shall be AC-to-AC, measured at 132 kV POI including auxiliary consumption.; LD applicable if below threshold
    c. Availability ≥ 95%; LD applicable for shortfall
    d. LD for shortfall in deliverable capacity at end of O&M period calculated for a notional period of 2 years

3.0.0 PROJECT DETAILS

Parameter	Specification
Technology	Vanadium Redox Flow Battery (VRFB)
Rated Power Capacity	20 MW (AC discharge, measured at Point of Injection/Metering — POI)

Parameter	Specification
Rated Energy Capacity	120 MWh (AC discharge, measured at POI)
Duration	the BESS shall be operated at approximately 1.5 cycles per day, with indicative charging and discharging schedule as under: Charging Period: 01:00 to 05:00 hrs and 09:00 to 16:00 hrs (approx. 11 hours) Discharging Period: 06:00 to 09:00 hrs and 18:00 to 24:00 hrs (approx. 9 hours)
Site Location	165 MW CCGT Power Plant Complex, Vadodara, Gujarat
Grid Interconnection	132 kV GETCO substation through existing transmission system.
Design Life	25 years from date of successful Commissioning
Cycle Life	Minimum 20,000 charge-discharge cycles
O&M Period	10 years the O&M Period shall be deemed to commence from the earlier of successful completion of OAT or 60 days from commissioning.
Measurement Point/POI/Delivery point	POI / Delivery Point shall mean GIPCL 132 kV switchyard bus / metering point as approved by GETCO.
Annual Capacity Degradation	Zero degradation permitted during O&M period
Black start	BESS shall have black start and grid-forming capability as per CEA/grid standards.
Reactive Power	As per grid compliance / as per latest code & standard and shall be through IBR (Inverter Based Resources).

4.0.0 EXCLUSIONS

Sl. No.	Item Excluded from Bidder's Scope
1	Land acquisition (BESS to be developed within the existing GIPCL plant complex)
3	Electricity charges for energy consumed from grid during BESS charging
4	GIPCL's corporate SCADA / Enterprise Management System beyond the BESS SCADA handshake point — however, all integration hardware and software up to the handshake point is in Bidder's scope
5	Statutory fees for connectivity (STU/GETCO)

5.0.0 TERMINAL POINTS

No terminal points are defined. The scope of work shall be as per the Tender Document.

6.0.0 GENERAL REQUIREMENTS

6.1.0 Project information is given in Annexure-A

6.2.0 The overall electrical system design for the Battery Energy Storage System (BESS) is based on principles that prioritize safe and reliable operation while facilitating ease of maintenance for the interconnected electrical infrastructure. This plant comprises a variety of equipment that collectively ensures the efficient functioning of the BESS.

- Vanadium Redox Flow Battery System
- Power Conditioning System (PCS) (Bi-Directional Inverter)
- Inverter Duty Transformer (IDT)
- Power, control and communication cables
- High Tension (HT) Switchgear at Local Control Room (LCR), located within the BESS Yard
- High Tension (HT) Switchgear / HT Incoming and Outgoing Panel (ICOG) at Main Control Room (MCR) located near existing 132 kV Switchyard in GIPCL premises.
- Power Transformer
- Switchyard and Transmission System
- Tariff & Metering Equipment
- Auxiliary System
- Earthing system
- Lightning Protection
- Illumination system
- BESS Plant Communication System
- Fire Fighting Systems
- Plant security and surveillance system
- All civil related works

6.3.0 This section focuses on the electrical systems extending from the VRFB System to the Point of Interconnection (POI) to the GETCO substation.

6.4.0 A new 11 kV switchgear is proposed to be installed in the Main Control Room (MCR) to pool power from the BESS plant before connecting to the step up power transformer.

6.5.0 The Bidder shall fully familiarize himself with the site conditions. The Bidders are advised to visit the site and acquaint themselves with the topography. The successful bidder shall be fully responsible for providing all equipment, materials, system and services which are required to complete the construction and successful commissioning, operation and maintenance of the BESS plant in all respects.

6.6.0 All materials and equipment furnished for permanent installation shall be new, unused and undamaged. Asbestos containing materials are not allowed.

6.7.0 Similar equipment and components shall be of same make. Equipment of same type and rating shall be interchangeable.

6.8.0 Required construction power and construction water shall be in scope of bidder only. GIPCL may only provide available tapping point, if any; arrangement, metering and charges shall be bidder's responsibility

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

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

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

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

- Indian Electricity Act and rules framed there-under
- Fire insurance regulations
- Regulations laid down by the office of the Chief Electrical Inspector to Government
- CEA guidelines / regulations / working committee reports etc.
- NFPA (National Fire Protection Association) codes and standards
- Any other regulations laid down by the local / central authorities

6.13.0 Bidder shall comply with Delivery Schedule requirements covered elsewhere in the tender specification.

6.14.0 Design of Facilities

- All the design procedures, systems and components proposed shall have already been adequately developed and shall have demonstrated good reliability under similar conditions elsewhere.
- The Bidder shall be responsible for the selection and design of appropriate equipment to provide the best co-ordinate performance of the entire system. The basic requirements are detailed out in various clauses of the Technical Specifications. The design of various components, assemblies and subassemblies shall be done so that it facilitates easy field assembly and dismantling. All the rotating

components shall be so selected that the natural frequency of the complete unit is not critical or close to the operating range of the unit.

6.15.0 Maintenance and Availability Considerations

- Equipment/facilities offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/ availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list.
- Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation.
- Lifting devices, i.e. hoists and chain pulley jacks, etc. shall be provided by the Bidder for handling any equipment or any of its parts having weight in excess of 50 kgs during erection and maintenance activities.
- Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist / crane shall be provided by the Bidder for lifting the equipment and accessories covered under the specification.
- Quality assurance, Quality plan and inspection requirements are detailed in Section-6.

7.0.0 SPARES

7.1.0 Mandatory Spares

Bidder shall provide one time supply of the mandatory spares after commissioning of the system as listed in Annexure B.

7.2.0 Deleted

7.3.0 Consumables

Supply of all consumables required for erection & commissioning and performance test is included in the scope and same shall be supplied by Bidder. Bidder to provide the list for the same in line with the format attached at Annexure C. In case of imported oils lubricants and other consumables the contractor shall identify the indigenous equivalents to arrange subsequent fills. Preference should be given to indigenous oil and lubricants during first filling itself.

8.0.0 SPECIAL MAINTENANCE TOOLS AND TACKLES

8.1.0 Special tools and tackle required for Operation, Maintenance, Inspection and Repair shall be supplied, neatly packed complete with operating instructions These shall not be used for

erection/commissioning purposes by the Bidder and shall be in unused and new condition, when they are handed over to the Owner.

8.2.0 Bidder shall supply the Special tools and tackles required for this system required for the successful operation and maintenance of the Plant.

9.0.0 GALVANIZING AND PAINTING

9.1.0 Painting of all equipment and structures as per GIPCL's standard color-coding scheme; quality per BIS standards, suitable for site environment. All structures shall be epoxy coated 2+2 coating with minimum 300 microns.

9.2.0 All works as per applicable IEC, IS, IEEE, BS, UL, DIN, VDE standards (latest editions); in case of conflict, tender specification prevails.

9.3.0 All support structures shall be hot dip galvanized with Minimum 80 microns. The galvanized surfaces shall consist of a continuous and uniformly thick coating firmly adhering to the steel surface. The finished surface shall be clean and smooth and free from defects.

9.4.0 For outdoor and Indoor equipment, painting procedure and pretreatment procedure shall be as per ISO 12944 and IS 6005 as per the site environmental conditions.

9.5.0 Shade of paint shall be as per the requirement of the Owner. Painting shall be carried out by approved process. Sufficient quantity of touch-up paint shall be furnished for application at site.

10.0.0 PACKING

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

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

10.3.0 All coated surfaces shall be protected against abrasion, impact, discoloration and any other damage. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of valves, piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

10.4.0 All equipment, especially electrical equipment, controls and insulation shall be provided with adequate protection against moisture / water and UV/Direct Sunlight.

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

10.6.0 Packing shall be taken care according to suit site conditions.

10.7.0 Bulky / Heavy spare items which are meant to be kept for long storage shall not be packed in Biodegradable material i.e. wood, corrugated board etc. These items shall be packed with

special materials which can withstand extreme weather conditions and shall be made of long-lasting, non-corrosive, anti-rusting materials.

11.0.0 GENERAL CONDITION FOR TESTING

11.1.0 The Bidder will provide the Owner with the reports from every type of test specified elsewhere in this specification during detailed engineering. The type test should have been normally carried out within the last ten (05) years of the bid opening date. However type test reports shall also comply GETCO requirement for 132 kV equipment and tariff metering system and compliance of CEA regulation/ guidelines. These reports should be for the test conducted on equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

11.2.0 Though, in the event that the Bidder is unable to submit the type test report(s) within the allotted time frame or if the type test report(s) are determined not to meet the specifications, the Bidder will conduct all tests required by this contract at no expense to the Owner, either at a third-party lab or in the presence of the client or Owner's representative or as per the statutory requirements, and submit the reports for approval. According to the specification and applicable standards, all routine and acceptance testing must be completed at no cost to the Owner.

11.3.0 The Bidder shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and Equipment and any part of the Facilities as are specified in the Contract.

11.4.0 No part of the Facilities or foundations shall be covered up on the Site without the Bidder carrying out any test and/or inspection required under the Contract. The Bidder shall give a reasonable notice to the Engineer In-Charge whenever any such parts of the Facilities or foundations are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

11.5.0 Tests shall only be conducted with the aid and in accordance with test specification(s) and standards clearly identified as approved for use by the Owner, and, where applicable, employ test instruments of suitable quality calibrated to manufacturer's recommendations by a reputable agency within the previous six (6) months.

11.6.0 In addition to the specifications already provided for the Plant, the test specification shall be supplied with the test results, and it shall include at least:

- Indicate the model
- Indicate the time of the tests
- Indicate the standards followed
- Cover a substantial percentage of the supported features of the equipment
- Indicate who carried it out

- The factory acceptance tests shall be carried out by the manufacturer in accordance with the requirements of IEC & UL.

11.7.0 Battery Energy Storage Testing

- The Contractor shall develop and submit to the Owner for its review and approval a comprehensive MQP that shall demonstrate that the ESS will meet the requirements of the specification. The Owner shall have the right to request reasonable changes to the test plan
- The contractor shall ensure the QAP contains a verification check of cell level and module level tracing procedure (Sl.no allocation). The serial numbers shall match those available in the test reports of VRFB System done at factory. The serial number shall be traceable to the level of raw materials.
- Where full-scale testing of larger systems at the factory may be difficult or impossible due to the large system, the MQP shall be carried out at a subsystem or module level and shall consist of tests of 100% of the subsystems or modules that comprise the complete ESS, to the extent possible. In the MQP plan, the Contractor shall clearly state what is being tested and shall fully explain any features or functions of the fully assembled ESS that would not be fully tested in the reduced-scale testing proposed. In such a case, the SAT plan shall further describe how the tests that could not be carried out in the factory will instead be carried out at the Site.
- During factory test, bidder shall demonstrate to the Owner/Owner's representative the complete operational, functional, protectional, Local/remote and chemical test by simulating situations.
- The ESS will not be accepted for shipment until all FATs have been successfully completed. In addition, the Owner will verify that all provisions of the contract have been met, including verification of all required submittals, any spare parts delivery, and any required system modifications.
- The ESS shall be tested during FAT and SAT as per all the relevant codes and standards.

12.0.0 QUALITY ASSURANCE & INSPECTION

12.1.0 The bidder shall provide list of all makes and models of the Battery, EMS and PCS along with test certificates, datasheets, list of projects supplied to by the OEMs with year of commissioning at the time of submission of the bid. Proposed equipment makes and model list of all other BoS electrical, civil and communication systems shall be submitted by the bidder during the bid. The approval of the makes and models of all equipment in the project shall be provided by the Owner

after the award of contract. Any deviation in the vendors from the list provided during the time of bid submission shall be subject to the approval of the Owner.

12.2.0 The final make selected out of the vendor listed in this tender document shall be subject to the Owner's final approval during detailed Engineering.

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

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

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

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

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

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

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

12.10.0 The Bidder/Vendor shall carry out all tests / inspections required to establish that the items / equipment conform to the requirements of the specification and relevant codes / standards specified in the specification, in addition to carrying out tests as per the approved quality plans.

Quality audit / surveillance / approval of the test results and inspection and acceptance of material will not, however, prejudice the right of the Owner to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service. Also, they shall not limit the liabilities and responsibilities of the Vendor in ensuring complete conformance of the materials / equipment supplied to relevant specification, standards, data sheet, drawing etc.

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

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

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

12.14.0 GIPCL or its authorised representative reserves the right to inspect, test, and witness Factory Acceptance Tests at the Contractor's or sub-vendor's facilities at any stage of manufacture, without additional cost to GIPCL.

12.15.0 Contractor shall submit a Quality Assurance Plan and Inspection & Test Plans (ITPs) for all major equipment for GIPCL's approval before commencement of manufacture.

12.16.0 Makes of all Bought-Out Items are subject to GIPCL's approval. Contractor shall submit a list of proposed sub-vendors for all major equipment for approval at the beginning of the contract.

12.17.0 Non-conformance found during manufacturing, inspection, or testing shall be reported and corrective action taken to GIPCL's satisfaction before dispatch. Rejection of any equipment shall not be a valid reason for delay in project completion.

13.0.0 COMPLETION OF FACILITY AND PERFORMANCE GUARANTEE PARAMETERS

13.1.0 GENERAL

13.1.1 The BESS shall be commissioned as per commissioning criteria and procedures specified under IEGC 2023, CEA, SLDC Gujarat, GETCO, GEDA and any other applicable statutory guidelines. All commissioning clearances shall be obtained from relevant statutory authorities before first synchronisation.

13.1.2 Pl refer relevant section in SCC.

13.2.0 **Pre-commissioning and Commissioning Test - Pl refer relevant section in SCC.**

13.3.0 **Part Capacity Commissioning - Pl refer relevant section in SCC.**

13.4.0 **Trial Operation - Pl refer relevant section in SCC.**

13.5.0 **Commercial Operation Date (COD) - Pl refer relevant section in SCC.**

13.6.0 **Performance Guarantee (PG) parameters**

13.6.1 All the equipment shall be guaranteed to meet performance requirements required under this specification and rectification shall be carried out until satisfactory results are obtained. The Owner reserves the right to reject the equipment if the performance values fall short of those indicated in the schedule of technical data sheets.

13.6.2 The guaranteed performance figures of the equipment/system shall be proved by the Contractor during the performance guarantee tests. Should the results of these tests show any decrease from the guaranteed values the Contractor shall modify the equipment as required to enable it to meet the guarantees. In such cases, Performance and Guarantee Tests shall be repeated within one month, from the date the equipment is ready for retest and all expenses for modifications including labour, materials and expense of additional testing to prove that the equipment meets the guarantees shall be borne by the Bidder.

13.6.3 In case of such option of rejection being exercised by the Bidder, Bidder shall replace the equipment which shall meet the guaranteed values. The Contractor shall furnish a detailed performance test procedure and a Programme well in advance for approval by the Owner.

13.6.4 During PG Test Period, MWh Capacity Installed Testing - Bidders shall demonstrate the MWh capacity at the point of interaction / Grid Point as per mutually agreed procedure during detailed engineering. Bidders shall augment the battery capacity of Vanadium Redox Flow Battery System at its own risk and expense in case MWh capacity installed is less than required value, within 15 days of demonstration made, failing which value estimated by Owner or OEM for such augmentation of Battery Storage System shall be recovered from the Performance Bank Guarantee.

Parameter	**Test Method / Criterion**
Rated Discharge Power (MW)	20 MW continuous discharge for 6 hours delivering 120 MWh at POI.
Rated Energy Capacity (MWh)	Complete charge-discharge cycle demonstrating minimum 120 MWh net energy at POI; measured by calibrated ABT/SEM meters; correction for ambient temperature if required per IEC 62933-2-1
Round Trip AC-AC Efficiency	Minimum 70% measured at POI; method as per Appendix 35(V1 section-7); including auxiliary consumption
Response Time	0 to rated power in ≤ 30 second (both charge and discharge); verified at POC
BESS Availability	Continuous operation over 72-hour test window with ≥ 95% availability (excluding force majeure)
VAR Support	Capability to provide reactive power in all four quadrants; dynamic test across Q range at POI

Parameter	Test Method / Criterion
Ramp Rate	Active power ramp from 0 to rated and rated to 0 within 1 second; measured at POC
Frequency Response	Response to simulated under-frequency event; primary frequency control droop to be demonstrated
Black Start Capability	BESS shall have black start and grid-forming capability as per CEA/grid standards.
Protection Functions	All protection functions (LVRT, HVRT, anti-islanding, overcurrent, over/under frequency, over/under voltage) to be verified by simulation or direct test
EMS/SCADA Functions	Demonstration of all EMS / SCADA / SAS / PPC control modes, SLDC communication, telemetry data transmission, and alarm handling

13.7.0 **PG Test Procedure - Pl refer relevant section in SCC.**

14.0.0 GUARANTEE

14.1.0 Bidder/Vendor shall guarantee that system engineered, and equipment offered shall meet the requirements as stipulated in this specification and as confirmed by them in technical data sheets.

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

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

15.0.0 TIME SCHEDULE

The following shall be the Scheduled Commissioning Date (SCD) for completion of work for this package which shall be from the date of issue of order:

Work	Schedule
Design, engineering, manufacture, testing, transport and delivery at site, loading, unloading, handling at site, storage, construction,	**18 months** from date of LoI/LoA

erection, testing, commissioning , Taking Over of overall system and any other activity to achieve SCD for 20MW/120MWh BESS Plant.	

16.0.0 PROGRAM OF PERFORMANCE

16.1.0 Within Fifteen (15) days after the date of notification of award, the Bidder shall prepare and submit to the Owner a detailed program of performance of the Contract, made in the form of the critical path method (CPM), the PERT network, MS-Project or other internationally used program and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and pre-commission the Facilities, as well as the date by which the Bidder reasonably requires that the Owner shall have fulfilled its obligations under the Contract so as to enable the Bidder to execute the Contract in accordance with the program and to achieve Completion, Commissioning and Acceptance of the Facilities in accordance with the Contract. The program so submitted by the Bidder shall accord with the Time Schedule included in the Contract Agreement and any other dates and periods specified in the Contract. The Bidder shall update and revise the program as and when appropriate or when required by the Owner, but without modification in the Times for Completion given and any extension granted and shall submit all such revisions to the Owner.

17.0.0 PROGRESS REPORT

The Bidder shall monitor progress of all the activities and supply a progress report to the Owner every month. The progress report shall be in a form acceptable to the Owner and shall indicate:

- percentage completion achieved compared with the planned percentage completion for each activity.
- And where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

18.0.0 STATUTORY COMPLIANCE

18.1.0 The Bidder shall obtain and pay for all permits, licenses and statutory approvals from local authorities for successful completion of project. Original copies of these approvals shall be delivered to the Owner or his authorized representative and will become property of the Owner. It must be understood and agreed that such factors have properly been understood and considered while submitting the bid. No claim whatsoever will be entertained by the Owner.

Neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Owner.

18.2.0 Bidder shall be responsible for obtaining statutory compliance for the entire project while applying for overall compliances

18.3.0 The Contractor shall obtain all required statutory clearances, approvals, and licences required for design, construction, commissioning, and commercial operation of the BESS plant.

18.4.0 Bidder shall comply all provisions and amendments thereafter of

- CERC 'Detailed Procedure for Connectivity and GNA' under the Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022 (If applicable)
- Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022 (If applicable)
- CEA (Technical Standards for Connectivity to Grid) Regulation,2007
- CEA (Technical Standards for construction of Electrical Plants and Electrical Lines) Regulation,2022
- Interconnection approvals from GETCO.
- SLDC Gujarat registration for scheduling and DSM
- GEDA (Gujarat Energy Development Agency) approvals, if required
- Environmental clearances (MoEF/State Pollution Control Board), if applicable
- CEA IEGC 2023 compliance certification
- Local municipal/GIDC/GIPCL plant management approvals for construction and operations
- CEA (Grid Standard) Regulation,2010
- CEA (safety requirements for construction, operation and maintenance of Electrical Plants and Electrical Lines) Regulations,2011
- CEA (Measures relating to Safety and Electrical Supply) Regulations,2010
- CEA (Installation and Operation of Meters) Regulations 2006
- Indian Electricity Grid Code Regulation,2010
- CEA (Technical standards for communication system in Power system operations) Regulation 2020
- CERC (Communication System for Inter State transmission of Electricity) Regulations 2017 (as applicable)
- MOP Order dated 02.07.2020 stating measures to protect the security, integrity and reliability of the strategically important and critical Power Supply System and Network in the Country.
- CEA (Cyber Security in Power Sector) Guidelines, 2021
- MNRE guidelines/OM/Advisory/Clarifications. MNRE approvals, if applicable
- GERC/GEDA/GETCO/SLDC), SNA (State Nodal Agency) guidelines, approvals and certifications.

- The Bidder shall comply with all requirements stipulated in the "Guidelines for Renewable Energy Project Development with or without BESS and Standalone BESS in Gujarat" issued by Gujarat Energy Development Agency (GEDA), and the applicable Operational Guidelines under the Gujarat Integrated Renewable Energy Policy – 2025.
- Obtaining all necessary approvals from GEDA shall be in the mandatory scope of the Bidder. However, statutory charges/payments payable to GEDA shall be reimbursed by GIPCL against submission of original receipts..
- And any other applicable standard/regulations

18.5.0 Bidder must comply with all the statutory requirements including BESS Power Plant, and equipment safety standards. The Plant should fully meet the Grid Connectivity Regulation as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 with all latest amendments

18.6.0 The following clearances shall be arranged by Bidder. However, necessary documentations/applications shall be in the name of Owner.

- Water Requirement during construction
- Power Requirement during construction
- SPCB clearance
- MNRE clearance
- Electrical Inspector clearance

19.0.0 GRID COMPLIANCE

19.1.0 Bidder shall support in providing any inputs in the form of PSSE or PSCAD models, documents, benchmarking reports, etc. for modelling of the system for grid compliance studies as set out by the guidelines of CTUIL/CEA/RLDC/SLDC/ALDC/STU/GETCO.

19.2.0 Bidder shall facilitate in addressing all the queries of CTUIL/CEA/RLDC/SLDC/ALDC/STU/GETCO with respect to reports and models are answered to their satisfaction.

20.0.0 HANDING OVER AND TAKING OVER (HOTO)

20.1.0 During the handing over of the Plant(s), the Bidder shall submit the following to consider final closer of contract.

20.2.0 All as-built Drawings

20.3.0 Technical document with detailed specifications, test results for all deliverable items, Operation & Maintenance and Safety Instruction Manual and other information about the project.

20.4.0 Plant performance approved report by Owner for the entire contractual period along with complete maintenance record

21.0.0 BILL OF MATERIAL (BOM)

Handover the tools and tackles at the end of the contract period to the Owner in good condition. Handover unused consumables of good quality to the Owner at the end of the contract period or as advised by the Owner.

22.0.0 SAFETY MANAGEMENT

22.1.0 Safety Philosophy: Safety of personnel, public, and equipment shall be of paramount importance throughout design, erection, commissioning, and O&M. Contractor shall comply with all applicable safety laws and GIPCL's safety guidelines. All safety regulations of the Factories Act, Indian Electricity Act, Electricity Rules, and applicable GIPCL/Gujarat State regulations shall be strictly followed.

Key Safety Requirements

22.2.0 Contractor shall appoint a qualified Safety Officer at site throughout construction, commissioning, and O&M.

22.3.0 Personal Protective Equipment (PPE) shall be mandatory for all personnel on site at all times — non-negotiable.

22.4.0 Hot Work Permit, Electrical Isolation Permit, and Work Permit systems shall be implemented per GIPCL's permit-to-work procedures.

22.5.0 All electrical work shall be carried out by licensed electricians under supervision of a licensed Electrical Supervisor.

22.6.0 Vanadium electrolyte is an acidic, hazardous substance — all handling personnel shall be trained; adequate PPE (acid-resistant gloves, goggles, apron, and emergency shower) shall be provided at VRFB area.

22.7.0 Hydrogen monitoring and ventilation system for all enclosed VRFB spaces shall be operational at all times.

22.8.0 Emergency Response Plan and first aid facilities shall be maintained throughout construction and O&M.

22.9.0 All accidents, near misses, and dangerous occurrences shall be immediately reported to GIPCL and concerned statutory authorities.

22.10.0 Contractor shall comply with E-waste and Hazardous Waste Management Rules for disposal of battery components, electrolyte, and any hazardous material.

23.0.0 DESIGN ASPECT

23.1.0 This section covers the design aspects of 132/11 kV substation (limited to new equipment to be supplied and replacement and maintenance work) and associated systems including 20MW/120MWh Vanadium Redox Flow Battery.

23.2.0 There is one GTG (Gas-Turbine Generator) rated for 111MW, and one STG (Steam-Turbine Generator) rated for 56MW that are individually connected to separate generator transformers rated 160MVA and 70MVA respectively.

23.3.0 The BESS system is connected to the LV side of the STG (GT-2) transformer (70 MVA) through the proposed 11kV switchgear at BESS yard, which then connects with the GIPCL 132kV substation.

23.4.0 Generator Transformers are connected to the Unit Auxiliary Transformers (UAT) through 500A rated tap-off Busduct. The generator transformer steps up the power to the 132kV voltage level and evacuates it via two transmission lines (Line-3 and Line-4) rated for 165MW each. Both lines are strung on the same tower up to the point of interconnection (Nandesari S/S).

23.5.0 The 132kV switchyard follows the Double main bus scheme. There are two numbers of line bay, one number of transformer bay and a bus coupler bay. From each IPBD there is a tap off connected to a UAT rated for 6.3MVA that steps down to 6.6kV voltage for the unit auxiliaries of each generating unit. From the 6.6kV level the power is further stepped down to 415V that cater to the other auxiliaries of the power plant.

23.6.0 The existing 11kV system is resistively grounded through the neutral of the generator. The generator shall no longer be in the electrical system, and the grounding shall become ungrounded. Hence, a Grounding Transformer is proposed which shall be adequately sized during detailed engineering.

23.7.0 The maximum power that can flow through the existing equipment to be used and not be replaced mentioned in this tender are adequate.

23.8.0 The existing GIPCL 132 kV switchyard is designed with double bus Air Insulated configuration in a double tier arrangement employing aluminum IPS tubular conductors for the main bus system and flexible droppers (tarantula type) for lines and transformer bay connections. :

23.9.0 System studies such as Load Flow, Short Circuit, Switching Transient & Insulation Coordination, Relay Setting Calculations, and Protection Coordination shall be carried out using the latest version of reputed software such as ETAP, Siemens PSS®E, or any other software as required by the concerned RLDC / ISTS authorities, along with PSCAD/EMTDC software, to establish the adequacy of the equipment ratings proposed under this specification.

The Bidder shall provide the required system files/models for validation to the Owner. Study reports shall be submitted in both soft and hard copies.

23.10.0 Approvals and Compliances for First Time Charging (FTC):

For obtaining First Time Charging (FTC) approval and compliance, the EPC Contractor shall consider all applicable procedures, guidelines, and requirements in their offer. The Bidder shall comply with the procedures stipulated by POSOCO / SLDC / ALDC / RLDC / NLDC and the guidelines on "Integration of New or Modified Power System Elements", CERC regulations, and any latest amendments / applicable guidelines issued in this regard for submission of documents and processing of FTC approval.

All activities, submissions, studies, approvals, and compliances required for FTC shall be completed by the Bidder at least six (06) months prior to commencement of FTC activities.

The following requirements are indicative and not limited thereto, and shall form part of the Bidder's scope (as applicable):

23.10.1 Equivalent Single Line Diagram (SLD) up to Point of Connection (POC) i.e. Delivery point / POI / Remote end S/s as required.
23.10.2 Submission of detailed and aggregated simulation models (PSS®E and PSCAD) along with reports up to POC / POI / Remote end S/s . Models shall be suitable for integration time steps between 1 ms and 20 ms and for simulation duration up to 600 seconds.
23.10.3 Submission of dynamic parameter files (*.dyr).
23.10.4 Submission of encrypted User Defined Models (UDM) compatible with the latest PSS®E release (*.dll files) for electromechanical transient simulations where validated generic models are not available.
23.10.5 Submission of user manuals/guides for encrypted models, including model setup procedures and corresponding transfer function block diagrams.
23.10.6 Submission of simulation results validating User Defined Models against actual measured data.
23.10.7 Black-box type model representation shall preferably be avoided.
23.10.8 Submission of PQ capability curve at POC and reactive power study report.
23.10.9 Modelling of Power Plant Controller in PSCAD platform.
23.10.10 Steady state studies including load flow analysis (base case and worst case), short circuit studies, etc.
23.10.11 Transformer and transmission line modelling, loading analysis, and electrical model block diagrams.
23.10.12 Dynamic and transient studies including voltage and frequency response tests.
23.10.13 EMT model of the plant in PSCAD platform and benchmarking through dynamic studies. Final updated dynamic model shall be submitted within one month from COD of the entire station.
23.10.14 Evaluation of fault levels and maximum short circuit levels at each bus.
23.10.15 Reticulation system drawings / SLDs as per RLDC / CTUIL/ SLDC / GETCO practices.
23.10.16 Registration on SLDC / GETCO / RLDC / POSOCO / NLDC portals for FTC, including payment of applicable fees.
23.10.17 Compliance with requirements related to power quality, DC content, harmonics, etc.
23.10.18 Coordination and obtaining required grid system data from concerned authorities by the EPC Contractor.
23.10.19 Obtaining transmission line parameters of the 132 kV transmission line between GIPCL and GETCO/STU from GETCO by the EPC Contractor.
23.10.20 Compliance with IEC-104 data requirements specified by RLDC / NLDC / SLDC / ALDC / POSOCO and completion of point-to-point testing.
23.10.21 Submission and approval of CON-4, CON-5, and CON-6 documents to/from concerned authorities.
23.10.22 Submission of simulation results validating generic models against User Defined Models (for P, Q, V, and I parameters) and against actual measured values after commissioning.
23.10.23 Establishment of data and voice communication with concerned SLDC / ALDC / RLDC in compliance with IEGC requirements.
23.10.24 Provision of all necessary protection systems as specified by the concerned Regional Power Committee (RPC).
23.10.25 Submission of protection settings to SLDC / RLDC for protection coordination.
23.10.26 Submission of any other information/documents as required by RLDC or other competent authorities.

23.10.27 Submission of Fundamental Frequency Temporary Over Voltage (FFTOV) study report, wherever applicable.

23.10.28 Compliance with any other latest requirements/guidelines necessary for obtaining FTC approval shall also be in the scope of the Bidder.

Sl.No.	Description	
Details of the existing 132 kV switchyard to be utilized for BESS integration (after specified scope of work mentioned in this tender)		
1.	**132kV AIS**	
	Bus bar scheme	Double Main bus scheme 2000 Amp, 31.5 kA
	Transformer Bays	1
	Line Bay	2
	Bus Coupler Bay	1
Details New Systems in the scope of bidder on EPC basis		
2.	**11kV Switchgear / system**	Shall be installed in the new Main Control Room (MCR), to be constructed adjacent to the existing 132 kV switchyard.
	Bus bar scheme	Single bus
	No. of 11kV Switchgears	1 at MCR 1 at BESS Yard (B-Plot)
	Panels in 11kV Switchgear at MCR (Bidder shall to refer DWG-2 - Conceptual 132 and 11 kV SLD and DWG-4 - Conceptual MCR Equipment Layout)	Feeder-1 Auxiliary Transformer Panel-1A & 1B Feeder- 2 Incomer Panel from BESS Field-1 rated for 20 MW/ 120 MWH BESS system requirements Feeder- 3 Outgoing Panel to Transformer LV (Rating shall be 4000 Amp) Bus PT panel - 1 Feeder- 4 Spare – 1 exactly identical to Feeder-2 Feeder-5 & 6 : Space provision for future use by the owner. Any other feeders required for BESS project (e.g. harmonic filters)
	Panels in 11kV Switchgear at BESS Field	– As per BESS system requirement.
	11kV (Un earthed) , 3-ph Zig-Zag Neutral Grounding Transformer and related system including but not limited to Load Break Switch (LBS) with Fuse, RVT, NGR, Protective relays, Instrments transformer etc.	1 Set

23.11.0 Follow the Key SLD attached to understand the electrical system details described in the tender.

23.12.0 . This equipment shall be suitable for outdoor applications having dusty & saline atmosphere and shall have tropical and fungicidal treatment (with corrosion class as per ISO 12944, C4-M). Electrical equipment selection and de-rating shall be based on design ambient temperature of 48°C or as per latest CEA guidelines whichever is higher and design relative humidity of 95% maximum.

23.13.0 Unless specified otherwise, at least 10 % margin (except 70 MVA 132 kV Power transformer) shall be considered in equipment sizing over and above the calculated load current / fault current / power requirements.

23.14.0 Auxiliary voltage levels shall be as follows:

- LV auxiliary supply : 415V (±10%), 3 phase, solidly earthed
- DC supply : 110V (+10% to -15%), unearthed
- UPS supply : 230V, 1 phase
- FOTE Supply : Universal 85 to 250 V AC/DC
- Metering : 100 - 230V AC/DC
- Power frequency : 50Hz
- Permissible frequency variation : +3% to - 3%
- Combined voltage & frequency variation : 10%(absolute)

23.15.0 All equipment, systems shall meet the requirements of the latest CEA / Electricity Regulatory Commission / Transmission Utility/ PSOSCO/ RLDC / GETCO / SLDC or similar competent authorities. Indicative list but not limited to such requirements is as under

CEA	Installation and Operation of meters Regulations 2006, 2010, 2014, 2019 and Draft for 4th amended.
CEA	Technical Standards for Connectivity to the Grid Regulations, 2007, 2013, 2019
CEA	Grid Standard Regulation 2010
CEA	Guidelines on Cyber Security in Power Sector 2021-1, Dated 7-10-2021
CEA-PCD	Various Recommendation of 'Standing Committee on Communication System Planning in Power Sector'
CEA	Technical Standards for Communication System in Power System Operations) Regulations, 2020
CEA	Indian Electricity Grid Code 2006, 2010
CEA	National / Regional Power Committee recommendation from time to time.
CEA	Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters Regulations, 2009, May 2018, Feb-2021

CEA	Safety · Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011.
CEA	Measures relating to Safety and Electricity Supply Regulations, 2010,2015,2018,2019 and Draft Regulation 2021
CEA-PSETD	Guidelines For Availability of Spares and Inventories for Power Transmission System (Transmission Lines & Substation/Switchyard) Assets
CEA	General Guidelines for 765/400/220/132 KV Substations and switchyards for Thermal and Hydro Power Projects-2012
CEA	Technical Standards for Construction of Electrical Plants and Electric Lines 2010 & 2015
CEA-PSETD	Standard specification for transformers for solar park pooling station-June'2021.
CEA-PSETD	Standard specification for transformers and reactors(66 kV and above Voltage Class) - Apr'21
CEA Letter	Short Circuit withstand testing of Transformer as per CEA's Regulation - Sep-2014
CEA	Manual On Transmission Planning Criteria-Jan 2013
CEA	Draft Procedure for coordinated transmission planning through the Regional Standing Committees for Power System Planning
POSOCO	Technical Specification for Interface Energy Meters, Automated Meter Reading System and Meter Data Processing for Inter State System in Western Region As approved in 34th TCC/WRPC meeting held on 28 July 2017
POSOCO	Consolidated procedure for first time charging / Energization (FTC) and integration of New or modified power system element-June-20
CIGRE	529 Guidelines for Conducting Design Reviews for Power Transformers
CEA	Deviation Settlement Mechanism and related matters Regulations, 2014 with all amendment.
CERC order	Detailed Procedure For "Grant of Connectivity to Projects Based on Renewable Sources to Inter-State Transmission System
CEA	Guidelines for the Validity Period of Type Test(s) Conducted on Major Electrical Equipment in Power Transmission

23.16.0 The substation shall be used for charging the battery containers, supplying station power to the BESS plant, and evacuating the energy stored in the BESS plant through existing 70 MVA 132 kV step-up transformer.

23.17.0 The sequence of outdoor bay portion shall be so arranged that the maximum horizontal angle of deviation of the incoming power and shielding conductors does not exceed 30°. Similarly,

the point of anchoring on incoming towers shall be such that the vertical angle of deviation is limited to 30° from horizontal plane.

23.18.0 Substation control scheme shall conform to the following, in general:

- Clear control priorities shall prevent the operation of any equipment which can be initiated at the same time from more than one of the various control levels. The priority shall always be on the lowest enabled control level.
- Signals from numerical protection relays shall be interfaced through communication port on IEC protocol 61850.
- The entire Substation shall be controlled and supervised from SCADA through HMI located in MCR.
- SCADA shall design to be immune against Electromagnetic Interference (EMI).
- For each bay, there shall be individual Local Control & Relay Panel. It shall be located in the MCR. All transducers, actuators and other field devices shall be terminated in it. Local Control & Relay Panel shall be hardwired with BCPU (Bay Control & Protection Unit) or BPU + BCU if BCPU functions, inputs are not adequate to meet tender or project requirement . BCPU (or BPU + BCU) shall be connected to HMI/Server in Control room. There shall be emergency trip button for circuit breakers on Local Control & Relay Panel. The bay level intelligent electronic devices (IED) for protection and control shall provide the direct connection to the switchgear without the need of interposing components and perform control, protection, and monitoring functions.
- Bay Level Unit (a bay comprises of on circuit breaker and associated disconnectors, earth switches and instrument transformer, Surge Arrestors), bay mimic along with relay and protection panels housed in air-conditioned C&R panel room and shall be located in C&R Room of MCR Building with HMI..
- For earth switches both electrical and manual operation from field is also envisaged..
- Nitrogen fire protection indications shall be integrated with numerical relays/BCPU (or BPU + BCU). Transformer protection potential-free contacts shall be hardwired for automatic actuation of fire protection systems.
- Bidder shall refer Detail Technical Specification, of this package for details of EMS.

24.0.0 GENERAL REQUIREMENTS

The bidder shall perform comprehensive testing of all existing electrical equipment at the Owner's 132kV Switchyard and at applicable bay equipment of GETCO switchyard

Being Brown Field Project New BESS plant integration with existing infrastructure and integration with existing 70 MVA power transformer, 132 kV switchyard and transmission lines, The following drawings, documents of existing system are included in the tender for general reference only. These may not necessarily represent the latest "as-built" or updated status.

The Bidder shall be solely responsible for verifying the actual site conditions, type, and quantum of work prior to submission of the bid.

No cost or claim shall be admissible on account of any discrepancies, deviations, or inaccuracies in the drawings, documents, or information provided herein.

All available details and documents have been provided in this tender. For any additional information, the bidder shall carry out necessary site assessment.

The Bidder is advised to visit the site to familiarize themselves with the site conditions. Site visits may be arranged with prior intimation and on a mutually convenient date and time.

Adequate space is available within the 132 kV GIPCL substation for the installation of additional equipment.

Drawings and document details:

Sr	Description	Sr	Description
A	**Switchyard**	**F**	**Lighting System**
1	Single Line diagram	1	Lighting layout
2	Layout plan	2	Lighting Tower
3	Layout section	3	ACDB & BMK SLD
4	Erection Key Diagram	**G**	**Transformer**
B	**Circuit Breaker**	1	Name Plate
1	Instruction Manual	2	Technical Details
2	GA & Schematic	3	Layout
C	**Isolators**	4	Earthing Layout
1	GA, DM & Schematic	5	OLTC Schematic
2	Details of Support for MOM	6	Instruction Manual OLTC
3	Details of Operating Pipe	7	Cooler Control Schematic
D	**Equipment Structure, Foundation and Outline**	8	Oil Test- BDV, PPM etc.
1	CT GA	9	Oil Test- DGA
2	CT Structure	10	Furan Test
3	SA Outline	**H**	**Bus Duct**
4	SA Structure	1	Layout
5	WT Outline	2	Erection Key Diagram
6	WT Foundation	3	Termination details at Transformer
7	PI Structure	4	Termination details at Wall
E	**Earthing System**	5	Cross Section
1	Earthing layout	6	Support Structure
		7	Expansion Joint, Disconnecting Link and Support Insulator
2	Earth Pit	**I**	**Hydrant System**
			Hydrant Network

Due to the large size of the individual files, bidders are requested to directly download the drawings and document details mentioned in the above table from the following link:

Existing GIPCL 132 KV Switchyard Docs Dwgs 3.zip

No password is required to access the link. The link shall remain valid until the effective date of bid submission.

Bidders shall refer "DWG_2 - Conceptual 132 and 11 kV SLD" at Existing Station-2 complex at Baroda included in the tender.

24.1.0 132kV Switchyard (GIPCL End)

a. Reuse of Existing Facilities.

The existing 132 kV switchyard , systems and equipment shall be reused, subject to verification of their suitability to comply with the latest standards and guidelines. Any required modifications or strengthening shall be carried out. This is an integral part of the Bidders Scope.

I. Overall switchyard structures, gantries, Towers, bus bars, equipment structure and foundations.

II. Power Transformer (70 MVA) , Circuit Breakers, Isolators, Surge Arrestors, Bus EMVTS (PTS).

These equipment's shall be reused after carrying out maintenance, testing and limited replacement, as included in the scope of work under this tender.

III. Transmission Lines . (Double Circuit lines installed on Multi Circuit Towers).

IV. OPGW system installed on Multi Circuit Tower.

V. Bus EMVT's. However, testing of Bus EMVTs shall be carried out by the bidder in accordance with relevant IEC/IS standards, including but not limited to IEC 61869 (Instrument Transformers) / IS 16227. The testing shall form part of the scope of work.

VI. Earthing System. However, augmentation / modification required due to new or replaced equipment – including earthing conductors, earth mats and earthing pits shall be in the scope of the bidder.

VII. Direct Stroke Lightning protection System.

VIII. Structure and foundations of individual equipment i.e. CT , CVT, Wave Trap, Surge arrestor available due to replacement, removal and shifting.

IX. RCC Cable Trenches. However, required augmentation / modification is in scope of the bidder.

X. Connectors and Droppers.

XI. Lighting Tower and its foundation (One Number located at South-West side of switchyard.) may be utilised.

b. Removal, Replacement, Shifting, Testing, and New Supply,

The bidders Scope shall include removal, replacement, shifting, testing and supply of new equipment's including but not limited to listed below.

I. Replacement of Existing Multi Core Current Transformers (used for protection, general metering and differential) of Line Bays (Line-3 and Line-4) , Transformer Bay (70 MVA) and Bus coupler bays.

II. New Tariff Metering (3- Phase) Current transformers MCT's) in Line-3 and Line-4 Bays at location of wave trap which is installed in R-Phase Only.

III. New Tariff Metering (3- Phase) EMVT's (MPT's) in Line-3 and Line-4 Bays at location of existing CVT which is installed in R-Phase Only. However structures and foundations of all three phases are available.

IV. New 3-Phase EMVT's in Line-3 and Line-4 Bays. (After shifting of SA to new location)

V. Removal of existing Wave Trap (R-Phase) from Line-3 and Line-4 Bays.

VI. Removal of existing CVT (R-Phase) from Line-3 and Line-4 Bays.

VII. Replacement/reuse of existing droppers and connectors. (Tarantula Conductors & associated clamps / connectors) of Transmission Lines and transformer bays.

VIII. Shifting or Surge Arrestors to new location in Line-3 and Line-4 Bays

IX. Removal and Replacement of all type of cables (end to end).

X. Removal of all Junction boxes, Marshalling boxes etc.

XI. Supply and installation of New Junction boxes, Marshalling boxes etc.

XII. Replacement of illumination system including but not limited to power receptacles.

XIII. Replacement of existing counters of all surge arrestor for Line-3, Line-4 and 70 MVA transformer bays. New surge counters shall have leakage current monitoring and shall be integrated to SAS / SCACA for counter operation. Down conductors and earthing system for SA as per project requirement.

XIV. Existing Surge Arresters (SA) shall be subjected to testing in accordance with relevant IEC/IS standards (IEC 60099 / IS 3070), including but not limited to leakage current measurement (resistive and total), reference voltage (Uref) verification, and insulation resistance measurement. In case the test results are found to be outside the specified/acceptable limits, new Surge Arresters of suitable rating and specifications shall be supplied and installed. Bidders shall provide optional rates for the same in the price schedule.

XV. Long-duration disconnection of the 160 MVA transformer (e.g., by removal of the centre arm of isolators and/or removal of DM box of isolators and/or removal of one section of the busbar and/or removal of droppers). The exact methodology and details shall be finalized during the execution of the work.

XVI. Existing clamps and connectors may be utilized, subject to detailed inspection, assessment, and validation of their mechanical, electrical suitability for the proposed application and system parameters. Any clamp or connector found unsuitable, damaged, undersized, deteriorated, or non-compliant with applicable standards and project requirements shall be replaced by the Bidder within the scope of work, without any cost to the Owner

c. Scope of work for following 132 kV equipment's. (Bidders shall refer respective sections of the tender documents for details)

I. 70 MVA transformer.

- General Maintenance of transformer and replacement of transformer accessories .
- Replacement of transformer firefighting system by NIFS system
- Replacement of Cooling Control Cabinet.
- Removal of existing busduct & providing new 11 kV Cable Box

II. Circuit Breakers.

- Maintenance work of Circuit Breakers (4 Nos) and replacement of control circuit components.

III. Isolators.

- Maintenance work of Isolators (13 Nos) and replacement of Drive Mechanism Boxes.

24.2.0 132kV Switchyard (GETCO/ STU / Grid Substation / Remote End)

I. New Tariff Metering (3- Phase) Current transformers MCT's) in Line-3 and Line-4 Bays as per requirement of GETCO S/s .

II. New Tariff Metering (3- Phase) EMVT's (MPT's) in Line-3 and Line-4 Bays as per requirement of GETCO S/s.

III. New Line EMVT's (3-Phase) may be required. Optional rates shall be furnished in the price schedule.

IV. Matching New Line CTs(3-Phase) shall be provided at GETCO end for both the lines.

Assessment, detailed engineering, necessary approvals, coordination with GETCO, and complete execution of the above works at the GETCO substation shall be entirely in the scope of the bidder.

- At GIPCL End, FOTE shall have the required hardware for 87L (OPGW is already available)
- Required hardware shall be provided in the existing FOTE (GE Make) at GETCO end.
- Matching Distance + Differential (21+87L) relays shall be provided at GETCO end and it shall be retrofitted in the existing C&R Panel.

24.3.0 Harmonic Filters.

The Bidder shall carry out harmonic studies as per grid compliance requirements. Supply, installation, erection, testing, and commissioning of harmonic filters, as required based on the system study, shall be in the Bidder's scope.

The harmonic filters shall be installed at the BESS Yard (B-Plot). Detailed technical specifications shall be finalized during detailed engineering and shall be in line with the specifications of similar equipment and systems covered under this Tender Document.

24.4.0 Control & Protection System

Numerical Relays:

All protection relays shall be numerical type with IEC 61850 compliance and in-built disturbance recorders.

All numerical relays shall be equipped with inbuilt disturbance recorders compliant with applicable regulations. Recording duration, number of channels (simultaneous), triggering inputs (External and internal), and storage capacity shall meet project and statutory / regulatory requirements.

Relay test blocks (RTBs) shall be provided for each numerical relay to facilitate testing without system interruption.

Control & Relay Panels (CRPs):
New CRPs shall be installed in the existing main control room. The following panels are to be provided:

- Line CRP Panels
- Transformer CRP Panels
- Bus Coupler CRP Panels
- Busbar CRP Panels
- SAS Server Panel

Communication Protocol:
IEC 61850 shall be used for all protection and control communication.

System Attributes:
The upgraded system shall ensure:

- High availability
- Enhanced reliability
- Robust security
- Scalable architecture for future expansion

24.5.0 Communication system

Supply, installation, testing, and commissioning of the complete communication system—including data, speech, voice, tele-protection, and telemetering—shall be in the scope of the bidder, as per the requirements of concerned authorities such as GETCO/STU/DISCOM.

The bidder's scope shall include all necessary equipment and components for a complete and functional system, including but not limited to approach cables, optical fiber cable (OFC), RTU, networking equipment/components, communication panels, power supply systems, interconnecting cables, and matching FOTE panels at the GIPCL end.

Phasor Measurement Units (PMUs) are not envisaged under the base scope. However, provision for space, integration, and readiness for future installation shall be included in the bidder's scope. The bidder shall also quote optional prices for supply, installation, and commissioning of PMUs, if required to be installed at both ends of the transmission lines

24.6.0 Tariff / SEM (Special Energy Metering) / Revenue / ABT (Availability Based Tariff) Metering system

Main and check tariff meters shall be installed for each transmission line at the GIPCL end. Standby and backup tariff meters shall be installed for each line at the GETCO end.

For Balance of Plant (BoP) auxiliary systems, main meters shall be installed at the 11 kV panel of the auxiliary transformer and at the 415 V side of the auxiliary transformer, both located in the MCR. In case the bidder adopts a separate auxiliary supply arrangement for the BoP of the BESS plant, ABT metering shall be provided as per project requirements and applicable statutory regulations.

The tariff metering system shall include, but not be limited to, the following: Tariff metering system essentially include by not limited to followings.

Dedicated instrument transformers (CTs and PTs)

I. Tariff meters (main, check, standby, and backup as applicable)
II. Obtain unique serial numbers for each meter from Utility.
III. Automated Meter Reading (AMR) system
IV. Base computer hardware and software for data acquisition, storage, and reporting
V. CMRI (Common Meter Reading Instrument) system
VI. Testing and calibration of instrument transformers and meters at NABL-accredited third-party laboratories
VII. Time synchronization system (e.g., GPS/NTP-based)
VIII. Comprehensive tamper-proof sealing arrangement

IX. Liaisoning with concerned authorities (GETCO/STU/DISCOM) for approvals, integration, and commissioning

The bidder shall refer to the relevant sections of this tender document for detailed technical and statutory requirements.

ANNEXURE-A: PROJECT INFORMATION

1	Owner	: Gujarat Industrial Power Co. Ltd
2	Owner's Engineer	
3	Project	: Turnkey EPC Specification for 20MW/120MWh BESS Plant
4	Site location	: Vadodara, Gujarat
5	Nearest airport	: Vadodara international airport (15 km Aerial distance approx..)
6	Nearest railway station	: Vadodara junction (13km approx.)
7	**Electrical Details**	
A	Electrical voltage levels	
	Power frequency	: 50Hz (+)3% to (-)5%
	HV system	: 132 kV (±)10% volts, 3 phase, solidly Earthed system
	MV system	11 kV Ungrounded
	LV system	: 415V (±)10%, 3 phase, 4 wire, solidly earthed system
	Auxiliary supply	: 240V (±)10%, 1 phase
	Control supply	: 110V DC (+)10% (-)15%
	UPS supply	: 230V (±)10%, 1 phase
B	Short circuit levels	
	132 kV system	: 31.5 kA for 1 second
	11 kV system	: As per bidders design
	415 V system	: As per bidders design
C	Design Aspects	
	Maximum Ambient Temperature	48°C or as per latest CEA guidelines whichever is higher.(design fo output accordingly.)
	Minimum Ambient Temperature	5°C
	Design Relative Humidity	Up to 95% non-condensing
	Altitude	Approx. 39 m above MSL (Vadodara)
	Rainfall	As per Vadodara meteorological data
	Seismic Zone	Zone III (as per IS 1893) — applicable to Vadodara
	Wind Speed	As per IS 875 Part-3 for Vadodara — basic wind speed 39 m/s
	Corrosion Category	C4 (high-severity industrial petrochemical environment)
	Pollution Level	Medium (as per IEC 60815 for HV insulation)

ANNEXURE-B: List of Mandatory Spares

Bidder shall provide a one-time supply of the mandatory spares required for this system as listed. Bidder shall include other spares not specified in the Mandatory spares but required for the successful operation and maintenance of the Plant.

S.No	Description	Qty	UoM
VRFB system of BESS			
1	Pump& Motor of each type and rating.	5%	Lot
2	Power Stack of each type and rating.	5%	Lot
Battery Management System			
3	Sensor of each type	5	Lot
4	Electronic Module / Card of each type	1	Lot
5	Mother Board	1	Nos
Fire Protection System			
6	Detector of each type (Hydrogen, Smoke, Thermal etc.)	5	Lot
7	Electronic Module / Card of each type	1	Lot
8	Mother Board	1	Nos
9	Emergency stop button	1	Nos
10	Horn/Strobe/Annunciator	1	Nos
11	Alarm bell	1	Nos
Power Conditioning System (PCS)			
12	Electronic Module / Card of each type	1	Lot
13	Mother Board	1	Nos
14	Cooling Fan of each type and rating	4	Lot
15	IGBT Stack complete with heat sink and accessories.	2	Lot
16	Semiconductor Fuse assembly complete with holder, like and carrier of each type and rating	12	Lot
17	Air Circuit Breakers (ACB) of each type and rating complete assembly	1	Lot
18	ACB Closing Coil of each type and rating	2	Lot
19	ACB Tripping coil of each type and rating	2	Lot
20	ACB Spring charging motors of each type and rating	2	Lot
21	ACB Aux. Contact Block of each type and rating	2	Lot
22	ACB Set of Main Contacts of each type and rating	1	Lot
23	ACB Set of Fix Contacts of each type and rating	1	Lot
24	ACB Electronic protection unit of Breaker of each type and rating	1	Lot
25	DC Switch of each type and rating	1	Lot
26	Human-Machine Interface (HMI) of each type	1	Lot
27	Temperature Sensors of each type	2	Lot
28	Voltage Sensors of each type	2	Lot
29	Current Sensors of each type	2	Lot
30	DC Surge Arrestors of each type and rating	3	Lot
31	AC Surge Arrestor of each type and rating	3	Lot
32	AC Contactors of each type and rating	2	Lot
33	DC Contactors of each type and rating	2	Lot
34	Air filter set of each type and rating	5	Lot

35	Aux AC Relays of each type and rating	3	Lot
36	Aux DC Relays of each type and rating	3	Lot
SCADA, PPC and EMS System			
37	Ethernet switch of each type	1	Lot
38	Converters of each type	2	Lot
39	Routers each type	1	Lot
40	Gateway of each type	1	Lot
41	Fibre Optic Transceivers of each type	2	Lot
42	PLC of each type	1	Lot
43	Data Bus Cable of each type	2	Lot
44	Connecting cable (any FRC, OFC Patch Cord) and plugs.	2	Lot
45	Lugs & glands -Various Sizes	3	Lot
46	Firewall	1	Nos
47	Electronic Modules of each type (including but not limited to CPU, Power supply, I/O, Communication etc.)	1	Lot
48	IP telephone	1	Nos
UPS & UPS DB's			
49	Electronic Module / Card of each type	1	Lot
50	Mother Board	1	Nos
51	Each type of Main and Auxiliary relays	1	Lot
52	Cooling fan with motor assembly	1	Lot
53	MFM of each type	1	Lot
54	Measuring instruments of each type and rating (Other than MFM)	1	Lot
55	Static Transfer Switch of each type and rating.	1	Lot
56	Bypass switch of each type and rating	1	Lot
57	Set of contactor and MCB's of each type and rating	1	Lot
58	Set of Filter capacitor	1	Lot
59	IGBT Power Module / Stack / Rack of each type	1	Lot
60	Set of fuses for each type and rating	1	Lot
61	SPD of each type and rating	1	Lot
62	Aux. relays, Auxiliary Contactors, Push Buttons, Switches, Indicating Lamps, LED Cubical illumination Lamp, Annunciator , Control MCB, Control Fuses with carrier base and links, Timers, Power and Control Terminal Blocks etc. of each type & rating	1	Lot
63	Panel hardware accessories like Gasket, Knobs, Door Locks , Handle , Hinges, filter , Power Terminal Block shroud etc. of each type	1	Lot
110 V DC Battery Bank			
64	Spare battery dry cell	10	Nos
65	Inter cell connectors complete set of one Battery Bank with Nut Bolts, Washers etc.	1	Set
66	Inter row connectors complete set of one Battery Bank with Nut Bolts, Washers etc.	1	Set
67	SAN container of battery bank with top cover (Empty)	5	Nos
68	Vent plugs	20	Nos
69	Electrolyte	10%	Set
110 V DC Battery Chargers and DCDB			

70	SMPS module of each rating	2	Set
71	Main Controller and or HMI of each type	1	Set
71	MCCB's (Manual) of each rating (Including Battery room MCCB's)	1	Set
72	MCCB's (Motorised) of each rating (Including Battery room MCCB's)		
72	Voltage regulator of each type and rating with set of heat sinks	1	Set
73	Power and Control Fuses (Base , Carrier and Links) of each type and rating	1	Set
73	Meters / Transducer / Shunts/ SPD / Switches of each type and rating.	1	Set
74	Insulation monitoring device of each type	1	Nos
74	Annunciator of each type	1	Nos
75	LED indicating lamp and Push Button of each type and rating	20%	Set
75	Discharge resistance Bank elements of each type and rating	1	Set
Substation Automation System (SAS)			
76	SMPS of each type	1	Set
77	Auxiliary relays of each type & make	3	Set
78	FO patch card of each type	3	Sets
79	Ethernet Switch of each type	1	Set
80	Fan assembly of each type	1	Set
FOTE Communication Panel			
81	Card / Module / PCB of each type including power supply Module	1	Set
82	Connector of each type	3	Set
83	Connecting cables of each type	3	Sets
84	Protection coupler	1	Set
85	Fan assembly of each type	1	Set
CCTV			
86	Camera of each type	2	Set
87	Each type of electronic module / PCB of each type and rating (of NRV system)	1	Set
Control and Relay Panels including RTCC Panel			
88	Numerical Relays of each make and type.	1	Lot
89	Bay control unit (BCU), each make and type.	1	Lot
89	Power Quality Meter along with its accessories (PQM)	0	-
90	Phasor Measurement Unit (PMU)	0	-
90	Check synchronising and auto recloser relays (if not integral part of other relay)	1	Lot
91	Remote tap position indicator	1	Nos
91	Space Heater, Thermostat, Door switch, Panel Handles, Hinges of each type.	1	Lot
92	Aux. relays, Contactors, Push Buttons, Switches, Indicating Lamps, LED Cubical illumination Lamp Annunciator, MCB, Fuses with carrier base and links, Timers, Terminal Blocks etc. of each type & rating	1	Lot
92	Hooter and Annunciator of Each type	1	Lot
93	Multi function Meters (MFM) of each type.	1	Lot
93	Trip Circuit Supervision Relay for Breaker of each type	1	Lot
94	Trip Circuit Supervision Relay for Master Trip Relay of each type	1	Lot
94	Test Terminal Block of protective relays of each type	1	Lot

95	Test Terminal Block of metering of each type	1	Lot
95	Master Trip Relay each type	1	Lot
96	DC Failure, AC Failure, Fuse Failure relay of each type.	1	Lot
96	Hooter of Each type.	1	Lot
97	Meters of each type (other than MFM's and PQM)	1	Lot
97	Communication Probes / wires / connectors of each type for numerical relay	1	Lot
98	Semaphore of each type and size	1	Lot
132 kV Switchyard			
99	Tariff Metering Current Transformer (MCT)	2	Nos
100	Tariff Metering EMVT (MPT)	2	Nos
100	Transmission Line Current Transformer (Multi Core)	2	Nos
101	Transmission Line EMVT (Multi Core)	1	Nos
101	Counter for Surge Arrestor with SAS monitoring facility	2	Nos
132 kV Circuit Breaker			
102	Closing Coil : Make CGL	2	Nos
103	Tripping Coil: Make CGL	4	Nos
103	Compressor: (Ingersoll-Rand, Model 234)	4	Nos
104	Compressor Motor	2	Nos
104	Compressor Drive Belts	4	Nos
105	Power Contactor each type	4	Nos
105	Auxiliary Contactor each type	6	Nos
106	AC MCB each type	4	Nos
106	DC MCB each type	4	Nos
107	Local Remote Selector Switch (43 LR)	2	Nos
107	Trip Neutral Close (TNC) Switch	2	Nos
108	Door Limit Switch	4	Nos
108	Overload Relay and Single Phase Preventer (49M)	2	Nos
109	Anti-Vibration Mounting Blocks	12	Nos
109	SF_6 gas cylinders, each having a gas content of approximately 12 kg	3	Nos
132 kV Isolators (Disconnectors			
110	Drive Mechanism Box (Complete Set) for Disconnectors	2	Nos
111	AC MCB each type	4	Nos
111	DC MCB each type	2	Nos
112	Control Switches of each type and rating	2	Set
112	Limit Switches of each type and ratings	2	Set
113	Auxiliary Contact Block of each type and rating	4	Set
113	Power Contactor each type	6	Nos
114	Auxiliary Contactor each type	10	Nos
132 kV Power Transformer (70 MVA)			
115	Complete Winding Temperature Indicating equipment (WTI) with capillary temperature sensor and 4-20 ma transmitter	1	Nos
116	WTI CT of each type and rating		
117	Oil temperature indicator with capillary temperature sensor and 4-20 ma transmitter	1	Nos

118	Buchholz relay complete unit	1	Nos
119	Gas Collection Device assembly	1	Set
120	OLTC Surge Relay		
121	Pressure Relief Device with drain assembly.	1	Nos
122	Magnetic Oil Gauge (MOG)	1	Nos
123	Silica Gel Breather of each type	1	Lot
124	Transformer Oil in 210 Litre (Approx.) Drums	10	Nos
Inverter Duty Transformer (IDT)			
125	Set of Gaskets (Each set shall represent complete quantity of different types of gaskets used in one transformer. Total list of gaskets shall be indicated by bidder during detailed Engineering)	1	Set
126	Set of valves (Each set shall represent complete qty of different types of gaskets used in one transformer. Total list of gaskets shall be indicated by bidder during detailed Eng..)	1	Set
127	Complete Winding Temperature Indicating equipment (WTI) with capillary temperature sensor and 4-20 ma transmitter	1	Nos
128	WTI CT of each type and rating		
129	Oil temperature indicator with capillary temperature sensor and 4-20 ma transmitter	1	Nos
130	Buchholz relay complete unit	1	Nos
131	Gas Collection Device assembly	1	Set
132	Pressure Relief Device with drain assembly.	1	Nos
133	Magnetic Oil Gauge (MOG)	1	Nos
134	Prismatic Oil Level Gauge (POG) assembly	1	Nos
135	LV Bushing with metal parts and gaskets of Inverter Transformer	1	Set
136	HV Bushing with metal parts and gaskets of Inverter Transformer	1	Set
137	HV neutral bushing	1	Set
138	Transformer Oil	10%	Litre
139	Current Transformer of each type	3	Lot
140	Potential Transfomer of each type	3	Lot
141	Silica Gel Breather of each type	2	Lot
142	Air cell of each type	1	Lot
143	Tap changer contacts of each type	1	Lot
144	Neutral Bushing of each type	2	Lot
145	Shield bushing each type	1	Lot
146	Earthing support insulator (if equipped) of each type	1	Lot
147	CCU of each type	1	Lot
148	HV Cable box Disconnecting link of each type	3	Lot
149	LV Cable box Disconnecting link of each type	3	Lot
150	Insulators of each type	1	Lot
151	Bus bars of each type	2	Lot
NIFPS System for Power Transformer and IDT. Spares shall be of each type , rating and make.			
152	Transformer Conservator Isolation Valve (TCIV) with limit / position switch assembly of each type	1	Lot
153	Quartzoid bulb detectors of each type.	8	Lot

154	Limit switches for Quartz Bulb of each type	8	Lot
155	Set of Valves (each size each type)	1	Lot
156	Pressure gauge, limit switches etc of each type	1	Lot
157	Signal box of each type and size	1	Lot
158	Junction box of each type and size	1	Lot
159	Nitrogen Cylinder of each size	2	Lot
160	Fire Survival cables (Qty = used in Power Transformer and one IDT of highest rating)	1	Lot
161	Set of OEM Recommended spares for Fire Extinction Cubicle (FEC) including but not limited to Gas Release Unit, Oil Release Unit, Pressure Setting Device, Gas Flow Control Unit	1	Lot
Auxiliary Transformer Aux. (Items of Each type, Each Rating, Each make.)			
162	Set of Gaskets (Each set shall represent complete quantity of different types of gaskets used in one transformer. Total list of gaskets shall be indicated by bidder during detailed Engineering)	1	Lot
163	Complete Winding Temperature Indicating equipment(WTI) with capillaries and temp. sensor	1	Lot
164	Oil Temperature Indicator (OTI) with capillaries and temperature sensor	1	Lot
165	CT of each type	2	Lot
166	Transformer oil	10%	Litre
167	Silica Gel Breather	1	Lot
168	Pressure relief device	1	Lot
169	Set of Valves	1	Lot
170	Buchholz relay	1	Lot
171	HV bushing	2	Nos
172	LV bushing	2	Nos
173	Neutral LV bushing	1	Nos
174	Neutral HV bushing (If applicable)	1	Nos
175	Magnetic oil Gauge	1	Lot
176	Prismatic Oil Level Gauge (POG) assembly	1	Lot
177	WTI CT	1	Lot
178	Gas Collection Device assembly	1	Lot
179	Tap changer contacts	1	Lot
Dry type Transformer			
180	Dry type Transformer, Complete Assembly of each type, rating and make	1	Lot
11 kV Switchgears and Panels (MCR, BESS Field and Neutral Grounding System.)			
181	Vacuum Circuit Breaker of each type and Rating	1	Lot
182	Surge Arrestor of each type and rating	3	Lot
183	Tariff Metering PT of each rating and Class duly tested at NABL Lab	2	Nos
184	Tariff Metering CT of each rating and Class duly tested at NABL Lab	2	Nos
185	CT of each rating and class (Other than Tariff Metering CT)	3	Lot
186	PT of each type and rating (Other than Tariff Metering PT)	3	Lot
187	Zig Zag NGT complete Unit	1	Nos
188	Neutral Grounding Resistance complete unit	1	Nos
189	Load Break Switch Assembly	1	Nos

190	RVT of NGT	1	Nos
191	Numerical relay of each type.	2	Lot
192	Bay Control Unit of each type (as applicable)	1	Lot
193	Master Trip Relay of each type	2	Lot
194	Trip Circuit Supervision Relay of each type	2	Lot
195	Auxiliary Relays of each type including DC, AC , Fuse failure, contact multiplication etc. but other than Master Trip and TCS	2	Lot
196	Communication Probes / wires / connectors of each type for numerical relay	2	Lot
197	Annunciation units of each type, Size and make	2	Lot
198	Hooter of Each type.	2	Lot
199	Multi-function Meters (MFM) of each type and make	2	Lot
200	Meters of each type (other than MFM's)	2	Lot
201	Fuses of PT of each type and rating	6	Lot
202	Busbar support Insulators of each type rating	6	Lot
203	Spring charging motor of each type and rating. (VCB)	2	Lot
204	Set of Fixed contact assembly of one VCB of each type and rating.	1	Lot
205	Set of Moving contact assembly of one VCB of each type and rating.	1	Lot
206	Complete assembly of Cooling fan of each type, Size and rating with monitoring system specified in the tender.	1	Lot
207	Closing coil of each type (VCB)	2	Lot
208	Tripping coil of each type (VCB)	2	Lot
209	Auxiliary switches / contact bock (VCB) of each type and rating	2	Lot
210	Limit switches of each type and rating	2	Lot
211	Space Heater, Thermostat, Door switch, Panel Handles, Hinges of each type.	3	Lot
212	Auxiliary Contactors of each type, rating and make.	5	Lot
213	Auxiliary contact block of control contactor of each type, rating and make.	5	Lot
214	Push Buttons, each type, rating and make.	3	Lot
215	Indicating Lamp of each type, Colour and Size	4	Lot
216	Control MCB AC & DC of each type and rating.	4	Lot
217	Set of Control Fuses with carrier base and links of each type and rating (as applicable)	4	Lot
218	Limit switches of each type and rating	4	Lot
219	Cubicle illumination lamp of each type and rating	5	Lot
220	Local Remote control Switches of each type and rating	2	Lot
221	Trip - Neutral - Close Control Switch of each type and rating	2	Lot
222	Timers of each type and rating	2	Lot
223	Converters (communication) of each type	2	Lot
224	Control Terminal Block of each type and rating	10%	Lot
225	Panel hardware accessories like Gasket, Knobs, Door Locks , Handle , Hinges, filter , Power Terminal Block shroud etc. of each type	4	Lot
226	Test Terminal Block of protective relays of each type	1	Lot
227	Test Terminal Block of Metering system of each type	1	Lot
228	VCB operating Handle	2	Lot
229	Inspection window glass with gasket		

LT Switchgears and Panels (MCR and BESS Field)			
230	Air Circuit Breaker (ACB) of each type and rating	1	Lot
231	Power MCCB (Motorised) of each rating and type	2	Lot
232	Power MCCB (Manual) of each rating and type	2	Lot
233	MCB of each rating and type	4	Lot
234	Power Contactor of each rating and type	2	Lot
235	CT of each rating and class	3	Lot
236	PT of each type and rating	3	Lot
237	Numerical relay of each type.	1	Lot
238	Electronic Motor Protection Relay of each type and rating	3	Lot
239	Master Trip Relay of each type	2	Lot
240	Trip Circuit Supervision Relay of each type	1	Lot
241	Auxiliary Relays of each type including DC, AC , Fuse failure, contact multiplication etc. but other than Master Trip and TCS	2	Lot
242	Multi function Meters (MFM) of each type.	1	Set
243	Meters of each type (other than MFM's)	1	Set
244	Auxiliary Contactors of each type, rating and make.	4	Lot
245	Auxiliary contact block of control contactor of each type, rating and make.	4	Lot
246	Push Buttons, each type, rating and make.	3	Lot
247	Indicating Lamp of each type, Colour and Size	4	Lot
248	Control MCB AC & DC of each type and rating.	4	Lot
249	Set of Control Fuses with carrier base and links of each type and rating (as applicable)	4	Lot
250	Limit switches of each type and rating	4	Lot
251	Cubicle illumination lamp of each type and rating	5	Lot
252	Local Remote control Switches of each type and rating	1	Lot
253	Trip - Neutral - Close Control switches of each type and rating	1	Lot
254	Timers of each type and rating	1	Lot
255	Converters (communication) of each type	1	Lot
256	Control Terminal Block of each type and rating	10%	Lot
257	Communication Probes / wires / connectors of each type for numerical relay	1	Lot
258	Test Terminal Block of protective relays of each type	1	Set
259	Test Terminal Block of Metering system of each type	1	Set
260	Closing coil of each type (ACB)	1	no's
261	Tripping coil of each type (ACB)	1	no's
262	Set of Fixed contact assembly of ACB of each type and rating.	1	Set
263	Set of Moving contact assembly of ACB of each type and rating.	1	Set
264	Set of Arcing contact assembly of ACB of each type and rating.	1	Set
265	Spring charging motor of each type and rating. (ACB	1	Set
266	Control Transformer of each type and rating	2	Set
267	Buzzer / Hooter / Bell of each type	1	Lot
268	Space Heater, Thermostat, Door switch, Panel Handles, Hinges of each type.	2	set
269	Panel hardware accessories like Gasket, Knobs, Door Locks, Handle, Hinges, filter, Power Terminal Block shroud etc. of each type	3	Set

Power Cables			
270	HT / MV Power Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
271	HT / MV Power Single Core Cable Termination Kit for each type and rating	6	Lot
272	HT / MV Power Three Core Cable Termination Kit for each type and rating	2	Lot
273	HT / MV Power Cable straight jointing Kit of each type and rating.	6	Lot
274	LT Power Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
275	LT Power Cable Heavy duty long barrel Lugs each type and size used in the project	15%	Lot
276	LT Power Cable Heavy duty brass double compression Gland of each type and size used in the project	15%	Lot
277	Route Marker of each type and size.	5%	Lot
278	Clamp of each type and size	5%	Lot
Control Cables			
279	Control Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
280	Control Cable Lugs each type and size used in the project	15%	Lot
280	Control Cable Heavy duty brass double compression Gland of each type and size used in the project	15%	Lot
Communication Cables			
281	LAN Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
282	Fibre optic Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
282	RS-485 Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
283	CAN Bus Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
283	Pair Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
284	Core Cables of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
284	Special cable other than listed above of each size, type and rating. 120% of Highest Length used in the project (To be supplied in single length only)	2	Lot
Lighting Fixtures and its accessories.			
285	Street Light fixtures including Drivers of each type and rating	5	Lot
286	Outdoor Light fixtures including Drivers of each type and rating,	5	Lot
286	Lighting Mast fixtures including Drivers of each type and rating	5	Lot
287	Indoor Light fixtures including Drivers and mounting kit of each type and rating,	8	Lot
287	Receptacles of each type and rating	5	Lot
288	Ceiling fan, Pedestal, Wall fan, Exhaust fan, Supply fan of each type and rating	2	Lot
288	Modular Switch Board fan regulator (if applicable)each type, colour, rating.	20%	Lot

289	Modular Switch board plates complete set of each type, size and colour.	20%	Lot
289	Modular Switch board Concealed and surface mounting Box of each type and size.	20%	Lot
290	Modular Switch board Switches of each type , colour and rating.	20%	Lot
290	Modular Switch board Power Sockets of each type , colour and rating.	20%	Lot
291	Modular Switch board RJ 45 outlets of each type , colour and rating.	20%	Lot
291	Modular Switch board Blanking module of each type , colour and rating.	20%	Lot
292	Lighting Distribution board components including MCBs, ELCBs, contactors, Power Switches, Control Switches, Fuse, Terminal Block, timers etc. of each type and rating.	20%	Lot
292	Multistrand flexible copper wires for Lighting system each size, rating , colours (Red, Yellow, Blue, Black, Green, white) in pack of 90 meter coil	10	Lot
293	Flexible, multicore copper sheathed unarmoured cable. 100 meter coil of 3Cx1.5 Sqmm, 3Cx2.5 Sqmm, 3Cx4.0 Sqmm,4Cx1.5 Sqmm, 4Cx2.5 Sqmm, 4Cx4.0 Sqmm	5	Lot
Air-conditioning system			
294	Complete set of each type of AC including all accessories and piping (highest length used in the project)	Set	1
295	Spare remote control of each type.	Set	1

Note: 1) The quantity of spares to be reckoned for % indicated shall be rounded off to the next higher whole number. For example if the % arrived is 0.2 the quantity to be supplied shall be 1 and if the % arrived is 5.1 the quantity to be supplied shall be 6.

2) Wherever all LOT or SET is mentioned, successful bidder shall provide detail description and specifications of each item, make, unit, quantity etc. during detail engineering stage. OEM part Number / drawing etc. shall be provided for ordering of the parts by owner in future. Interchangeability certificate shall be provided for each spare items.

3) Illustration of each make, type , rating etc.

For example, against Item No. 88, "Numerical Relays of each make and type" is specified with Quantity as "1" and Unit of Measurement as "Lot".

Suppose the following numerical relays are used in the project:

1. Line differential protection
2. Transformer Protection
3. Busbar Differential protection.
4. Feeder Protection relay
5. Neutral Displacement Relay ….
6. ……
7. …….

N. ROCF, UV, OV relay

Under this item, the Bidder shall supply one (1) number of each type of relay used in the project, covering all the above relay types up to "N".

For example, if the total number of distinct relay make/type combinations used in the project is 15, then the total quantity of relays to be supplied under this item shall be 15 Nos.

Annexure C - Special Tools, Tackles and Testing equipment's.

Sr.No.	Item	Qty	Unit
1	11 kV, Earthing trucks for bus side earthing for each type, size and for each location (MCR & BESS).	1	Lot
2	11 kV, Earthing trucks for Cable side earthing for each type , size and for each location (MCR & BESS)	1	Lot
3	11 kV Breaker (VCB) Trolleys of each type, size and for each location (MCR & BESS)	3	Lot
4	415 V Breaker (ACB) Trolleys for each type and rating of Breaker for each location for each location (MCR & BESS).	1	Lot
5	SF6 Gas Leakage Detector / Pointer Make DILO, Model No 3-033-R002 with spare sensor kit, carrier case, and operating manual.	1	Set
6	145 kV, Single Phase, FRP Earth/ Discharge Rod with 35 Sqmm Copper multistrand wire of 12 meter, Die cast alu. Grounding "C" Clamp complete set for with test certificate, carrying case and standard accessories.	3	Set
7	Crimping Tool, Dowell Make, Model SYT-7 with set of Hex Dies 25-400 Sqmm with standard accessories , carrying case etc.	1	Set
8	Crimping Tool, Dowells Make, Model SYT-50 16-50 Sqmm with standard accessories , carrying case etc.	1	Set
9	Crimping Tool, Dowells Make, Model SYT-02 0.5-16 Sqmm with standard accessories , carrying case etc.	4	Set
10	Fluke 1550C FC 5 kV Digital Insulation Tester with all accessories	1	Set
11	Insulation Resistance Tester, Fluke 1507 with carrying case and standard accessories.	1	No
12	Fluke 1623-2 GEO Earth Ground Tester Kit	1	Set
13	FLIR Thermal camera TG297, with required software, communication cables, carrying case and standard accessories.	1	Set
14	Digital Multimeter and Clamp meter combo kit, Fluke 117/323 with carrying case, holster, extra probes and standard accessories.	3	Sets
15	AC/DC Digital Clamp Meter, Make Kyoritsu, Model No KEW 2009R with standard accessories and output cord (7256), calibration certificate etc.	2	Nos
16	Multi fingered Relay Test Plug type with accessories - 6 Nos shorting Links and 2 Nos of 2 meter test wires with each test plug	4	Set
17	Leakage Clamp Meters Make Kyoritsu, Model No KEW 2413R with standard accessories and output cord (7073), calibration certificate etc.	2	Sets
18	DC Milliamp Clamp Meter Make Kyoritsu, Model No KEW 2500, with standard accessories and output cord (7256), calibration certificate etc.	2	Sets
19	Phase Sequence Meter, Make Kyoritsu, Model No KEW 8035 with standard accessories and calibration certificate etc.	1	Nos
20	Receptacles plug top of each type and rating	6	Nos
21	Fiberglass 28' Ladder rated ANSI Type IA .and compliant to OSHA and CSA safety standards, with advanced Rung Lock System for securing the fly and base sections, non-marring durable top with multiple tool slots, slip resistant rubber tread fully serrated for a slip resistant surface, rope and pulley, rung caps, heavy duty metal boot with steel swivel safety shoes Make Dewalt, Model No DXL3020-28PT or equivalent reputed make.	1	No
22	High tensile aluminum alloy wall supported ladder, closed height 16 ft, extended height 28' with Pulley, Safety Ring, Safety Locks, shall be of sturdy construction. (Make: Overseas Aluminum)	1	No

23	High tensile aluminum alloy telescopic tillable extension tower Ladder, height 32 ft, with Pulley, Safety Ring, Safety Locks, shall be of sturdy construction. (Make: Overseas Aluminum)	1	No
24	Steel Portable Foldable Platform Trolley Truck / Dolly Cart, Stanley PC528, for all indoor and outdoor manoeuvring-300 kg Capacity.	1	No
25	Master Tool Set Kit, Stanley 150 Pieces 94-181.	1	No
26	Hot air blower 2.0 m3/min, wolf make	1	Nos
27	Stanley STPT600 600W Variable Speed Blower with all accessories and carrying bag	2	No
28	Bosch GSB 600 RE 13mm 600 Watt Corded Smart Drill Kit.	1	No
29	Combination Spanner Set (Pack of 23) , Stanley 70-965E	2	Nos
30	Stanley Electrician Kit	3	No
31	Straight Cutter Stanley 2-14-563, 254 mm	2	Nos
32	Plier 10" Stanley 71-669	4	Nos
33	Pipe Wrench 12", Stanley 71-642	4	Nos
34	Wire Stripper, 5.5" Stanley 84-214-22	4	Nos
35	Hex key set (10-Pieces) Stanley 69-253	4	Nos
36	Mini Hack Saw 10" , Stanley 0-20-807	4	Nos
37	Stanley STHT57528-8 Rubber Mallet (680gms)	2	Nos
38	Insulation tape, Scotch:23, size 19mmX9.15 mtrsX0.75mm self-bonding electrical tape roll, make: Birla 3M	5	Nos
39	INGCO HTCS273281 328pcs Tool Chest Set Roller Cabinet with 7pcs Drawers	1	No
40	INGCO Brushless cordless impact drill CIDLI20868 with Battery, Charger, Spare Battery and carrying case	2	Set
41	INGCO 54PCS Impact Drill Machine CIDLI201452 with Battery, Charger, Spare Battery and carrying case	2	Set
42	INGCO 126 Pcs Cordless impact wrench tools set HKTHP31261 with Battery, Charger, Spare Battery and carrying case	1	Set
43	INGCO Cordless impact wrench CIWLI20551 with Battery, Charger, Spare Battery and carrying case.	2	Set
44	INGCO Cordless Blower CABLI203235 with Battery , with Battery, Charger, Spare Battery and carrying case	2	Set
45	INGCO Cordless work lamp CWLI20881 with Battery , with Battery, Charger, Spare Battery and carrying case	2	Set
46	INGCO 8V Cordless Screwdriver, 6 Nm, LED Light, Packed by Plastic Tool Box CSDLI08025	2	Set
47	INGCO 7 PCS Pliers Set COS23036	2	Set
48	INGCO Cordless angle grinder CAGLI2210032 with Battery, Charger, Spare Battery and carrying case		
49	Eureka Forbes Wet & Dry Ultimo Vacuum Cleaner with all accessories	1	Set

Note

1. Bidder's scope of supply for special tools standard warranty/guarantee, and software support (as applicable) and its free updates.
2. For all hydraulic items, spare set of "O rings" and gasket shall be provided.
3. Bidder shall supply Special Tools, Tackles and Testing equipment's within 6 months from the date of LoI / LoA
4. For Illustration of each type, size, location etc. please refer Note:3 of Annexure-B

Annexure -D –Comprehensive Operation and Maintenance

The successful Bidder shall carry out comprehensive Operation and Maintenance (O&M) of the complete project from the date of COD of full project capacity for a period of ten (10) years.

In addition, the Bidder shall carry out O&M for any part-commissioned capacity from the respective date of its commissioning until the COD of the full project capacity, after which O&M for the entire project shall continue for the balance period of ten (10) years.

GIPCL personnel shall have unrestricted entry to the BESS plant and Control Room at any time. GIPCL may depute its personnel to associate with O&M activities. All records of maintenance shall be maintained by the Contractor and handed over to GIPCL at end of O&M period.

O&M Scope of Work

Activity	**Description**
System Operation	Ensuring successful BESS plant operation for optimum charging/discharging as per SLDC schedule and GIPCL's instructions; declaration of day-ahead availability to GIPCL
Preventive Maintenance	Scheduled preventive maintenance as per OEM recommendations; annual overhauls; electrolyte sampling and testing; stack health monitoring
Breakdown Maintenance	Immediate response to any breakdown; deployment of O&M experts as required; target resolution within SLA timelines to be defined at contract stage
Performance Monitoring	Monthly calculation and reporting of RTE, BESS availability, dispatchable capacity, SOH; submission of performance reports to GIPCL
Spares Management	Supply of all spare parts, consumables, and materials required from time to time during O&M period at Bidder's own cost; maintain adequate O&M spare inventory at site GIPCL may, at its discretion, provide available spares, if any, for use by the Bidder. However, all such spares utilized shall be replaced by the Bidder with new, unused items of the same make and specifications, with confirmation of full interchangeability. The replenishment of such spares shall be completed within the stipulated time mutually agreed at the time of issuance.

Activity	Description
Electrolyte Management	Periodic electrolyte regeneration, re-balancing, or replenishment as required to maintain zero capacity degradation throughout O&M period
Logging & Records	Daily logging of all important BESS parameters; incident reporting; maintenance registers to be accessible to GIPCL on demand
Safety & Security	Deployment of sufficient security personnel; compliance with all safety regulations; immediate reporting of any accident
Software Updates	Replacement of equipment/spares or updating of software being phased out or no longer supported by OEMs — in Bidder's scope
Statutory Compliance	All tests and works required by statutory regulations in effect at time of bid opening — in Bidder's scope during O&M
Cleaning & Housekeeping	Regular cleaning of BESS area, battery yard, cable trenches, drain cleaning, herbicide spray, and grass cutting
Handing Over	At end of O&M period, hand over plant in completely healthy condition with no pending defects; spares and tools inventory to be returned or replaced
Disposal Plan	Bidder to have a documented plan for disposal and recycling of BESS components at end of life as per E-waste Management Rules 2016
Detail comprehensive O&M Scope	Bidder shall refer "V-II Section 2.33 DTS Comprehensive O&M" for further details over and above scope mentioned here.

Minimum O&M Staffing

Category	Minimum Number	Qualification
Plant-in-Charge (Resident)	1	BE/B.Tech Electrical or Electronics; min. 5 years relevant experience; licensed Electrical Supervisor
Electrical Engineer (Shift)	2 (to cover all shifts)	BE/B.Tech Electrical; min. 3 years power plant experience
Electrical Technician / Operator	4 (to cover all shifts including standby)	Diploma/ITI Electrical; min. 3 years experience
Instrumentation & Controls Technician	1	Diploma/ITI Electronics/Instrumentation; EMS/SCADA experience
Mechanical Technician cum Fitter	1	Diploma/ITI in relevant trade for maintenance of all piping work

Insurance During O&M Period

- Fire & Allied Peril insurance: in the name of GIPCL; insurance for theft to be taken by Contractor
- Workmen's Compensation Insurance: as per Workmen's Compensation Act, 1948 — statutory provisions
- Comprehensive Automobile Insurance: for all vehicles used in O&M activities
- Comprehensive General Liability Insurance: for all O&M works and personnel

Performance Parameters & LD for Shortfall During O&M - 13.1.1 Pl refer relevant section in SCC.

.

Annexure E- Vendor List

SR. No.	Equipment / System	Vendors
A	**ELECTRICAL EQUIPMENT / SYSTEM**	
1	132 kV EMVT	GETCO approved.
2	132 kV CT	GETCO approved.
3	132 kV SA	GETCO approved.
4	132 kV	GETCO approved.
5	Clamps, Connectors, Hardware	GETCO approved.
6	Inverter Duty Transformer	As per BESS OEM
7	PCS (Inverters)	As per BESS OEM
8	Control and relay panel	Siemens (Including their system houses) ABB/Hitachi (Including their system houses) Schneider (Including their system houses) ALSTOM (Including their system houses) GE (Including their system houses)
9	HT Panel (11kV)	ABB / Hitachi Energy (Including authorised system houses) Siemens (Including authorised system houses) L&T (Including authorised system houses) Schneider (Including authorised system houses) Lauritz Knudsen (Including authorised system houses) GE Vernova (Including authorised system houses) Trisquare Technocraft BHEL (Bhopal)
10	LT Panels	ABB (Including authorised system houses) Siemens (Including authorised system houses) L&T (Including authorised system houses) Schneider (Including authorised system houses) Lauritz Knudsen (Including authorised system houses) GE Trisquare Technocraft BHEL (Bhopal)
11	HT Circuit Breakers (11kV)	ABB Siemens L&T Schneider Electric Lauritz Knudsen Eaton Toshiba T&D GE Vernova BHEL (Bhopal)

12	11 kV HT Breaker Panel Cooling Fan	Ziehl-Abegg
12	LT Breaker	ABB Siemens Schneider GE Lauritz Knudsen L&T
14.1	Auxiliary Transformers (Dry type, Oil Type and HT and LT)	Tesla Danish CGL Transformers & Rectifiers India. Voltamp Bharat Bijli Kanohar Kalpa Electrikal Inverter OEM Approved (for Dry type only) Shilchar Technologies Ltd
14.2	Zig Zag Natural Grounding Transformer (NGY)	Raychem RPG Shilchar Technologies Ltd Hitachi Energy India Ltd Siemens Energy India GE T&D India / Prolec GE CG Power & Industrial Solutions Ltd. Transformers & Rectifiers Voltamp Transformers Ltd Western Transformers Servokon Systems
14.3	Neutral Grounding Resistance (NGR)	Hilkar Cressall Raychem RPG Trident Joventa /JEF Electricals Aditya Engineers Servokon Systems Ltd Trident Resistors Pvt. Ltd. Switchgear & Control Technics Pvt. Ltd
15	AVR relay for Digital RTCC	MR E-Berle E-Berle (Model: REG-D) ABB Siemens GE Statcon Schneider Numeric Ashida

16	Buchholz Relay	Instruments & Controls Yogya Sukrut Viat Instruments Pvt. Ltd. A.J. Services (Prayog) Cedaspe, Italy EMB Control AB, Sweden Weir Electric, UK VEB, Germany ASPE, Italy
17	Gas Collecting Device	Yogya Atvus -Viat Instruments ETI CEDASPE MR, Italy
18	Air cell (COPS)	Sukrut Nu Cork Products Pvt Ltd, Bhiwadi Fujikura, Japan Unirub Techno India Pvt Ltd, Pune Zenith Industrial Rubber Products, Thane Pronal, France
19	Breather	Yogya Sukrut Viat Instruments Pvt. Ltd. A.J. Services (Prayog) Instruments & Controls COMEM, Italy Tanjin Industries, South Korea
20	PRV / PRD	Sukrut Atvus Industries, Kolkata Yogya VIAT Instruments QUALITROL Company LLC, USA MESSKO, Germany
20	MOG	Sukrut Yogya Atvus -Viat Instruments Instruments & Controls COMEM, Italy MESSKO, Germany QUALITROL, USA Tanjin Industries South Korea Press N Forge
22	WTI & OTI	Precimeasure Perfect Controls QUALITROL AKM, Sweden MESSKO, Germany

23	Insulators MV, HV and EHT	Aditya Biral Insulator Morden BHEL GETCO Approved (for 132 kV System) WSI
24	Insulating Oil for New Transformers.	Apar Savita Raj Petro specialities Shell Eastern Petroleum Ltd. Nynas Sweden
25	Insulating Oil for 70 MVA transformer work.	As per Tender DTS
26	CT / PT (For LT Panels)	AE C&S Kappa Gilbert Maxwell Intrans ABB Pragati GE BHEL Siemens Precise Diana Electrical Kalpa Elect Narayan Powertech Silkans EC&S
27	11 kV CT , PT, CBCT, Neutral CT	Jyoti Switchgear Ltd. (JSL) AE Pragati Electricals Electrical Control & Systems (ECS) Insutech Industries Limited Precise Electrical
28	11 kV Surge Arrestors.	Oblum ELPRO Raychem
29	HT termination and Jointing kits	Raychem RPG (TE Connectivity – India) 3M India
30	Battery Sets	Exide
31	Numerical Protective Relays , BCU, BPU, and BCPU	ABB ALSTOM Schneider Siemens GE

32	ABT / SEM's / Tariff Meters and its accessories.	May be sourced from GETCO / DISCOM Secure
33	Power Quality Meter (PQM)	As per Tender DTS
34	Multi-Function Meters and Digital Meters	Siemens L&T Rishabh Schneider Secure ABB Conzerve
35	Battery Charger	Emerson Vertiv India HBL Power Systems Ltd Chloride Hitachi HI-REL Mass-Tech Controls Dhawami Power Systems AEG Power Solutions Delta Electronics India Statcon Energiaa Pvt. Ltd. Schneider Electric Exide Industrial (Chloride Metals) Amara Raja Power Systems Ltd Eaton Chhabi
36	DCDB	OEM of Battery Charger
37	11 kV HT Cables	Universal KEI KEC RPG Cables Dynamic Cables Polycab Torrent Apar Universal Finolex RR Kable Gemscab Sterlite CCI
38	LT Power & Control Cables and wires	Universal KEI KEC RPG Cables Dynamic Cables Polycab Torrent Apar Universal

		Gemscab Sterlite CCI LAPP NICCO
39	Exhaust Fans	Bajaj CGL Usha Polycab Atomberg Khaiten
40	Ceiling fans (BLDC)	Usha Crompton Orient Bajaj Atomberg Havells
41	Lighting Fixtures (Luminaries)	Philips Bajaj CGL Wipro Havells
42	Electronic Motor Protection Relay for LT System	Schneider C&S ABB Siemens
43	Semaphore Indicators	ABB Alstom/GE / Areva JVS Electronics Nelster Welcon Nova Espower Corpo Steam Airetric Controls MIMIC Products Silitronix Systems DAV Industries
44	Electronic Timer	GE ABB Schneider Siemens Omron Automation Selec Controls General Industrial Controls Salzer Electronics Ltd Telemechnic
45	Contactors	Schneider Siemens ABB GE Merlin Gerin , Telemechnic

46	MCCB /MCB / ELCB / RCBO / RCCB	SIEMENS ABB Schneider Hager Merlin Gerin GE AREVA EATON Allen Bradley
47	Receptacles	MDS Legrand Legrand ABB Schneider Hager BCH Power
48	Power and Control Fuses	Bussmann Siemens GE ABB
49	Transducers	Schneider GE Siemens ABB
50	Annunciator	Allen Proton Bharani Electronics Shayadri Electro Control Minilec VS Electronics
51	Single Phase Preventor and Phase Sequence Reversal Relay	Minilec Selec Schneider GIC L&T
52	Meters (Other than MFM , PQM and ABT Meters)	AE Schneider Electric DIP ABB Rishabh Socomec Eaton Secure
53	Control / Selector switches	Selzer Kaycee Switron Schneider Electric Alstom TEKNIC ABB

		Eaton Siemens
54	Relay test Block (RTB) Test Terminal Block (TTB)	Dev Schneider Electric DIP Phoenix Contact Deepl Elec. WAGO Elmex Controls Nelster Welcon ABB JVS Electronics
55	Terminal Block (TB's)	Elmex Controls Connectwell Industries Phoenix Contact WAGO
56	Earthing rod and Back fill compound	Ashlok JMV Earthing Equipment ERICO Axis Electrical Components JEF Techno
57	Lugs and Cable Glands (Metallic)	Dowell 3M India Comet TE Connectivity (Raychem RPG) Klauke (Textron) Compaq International 3D
58	Polyamide Glands	Hansel Elmex Controls Connectwell Industries Compaq International Hummel LAPP Phoenix Contact Rittal
59	Junction Boxes	Rittal Hensel nVent HOFFMAN ABB Schneider Electric Adlec Power Pvt. Ltd. C&S Electric
60	Modular Switches, Plates, Boxes, Power Sockets etc.	Schneider Norisys Technology Legrand Panasonic (Anchor - Roma Series)
61	LED Indicating Lamp and Push Buttons	SIEMENS ABB

		Schneider TEKNIC L&T RASS Controls (C&S)
62	Cubicle Illumination Lamp (LED)	Philips Bajaj Wipro Panasonic Havells
B	**INSTRUMENTATION AND CONTROL EQUIPMENT**	
63	Substation Automation System	Hitachi / ABB Siemens GE
64	Control system-Servers-Redundant with Windows OS & AV	HP Dell Lenovo Advantech Technics Infosol Portwell-Laxsons Avhis Technologies
65	Historian Servers-Redundant with Windows OS & AV	HP Dell Lenovo Portwell- Laxsons Avhis Technologies Advantech Technis Infosol
66	Network Switches-Redundant	Hrishmann Siemens (Ruggedcom) Cisco Brocade GarrettCom
67	PPC / EMS	As per BESS OEM
68	GPS Master Clock	Meinberg Sertel Sands Qualitrol Hathaway Siemens Masibus
69	Gateway	Siemens Moxa Fortinet Checkpoint Sophos Cisco Palo Alto Palo Alto
70	Historian station with Windows OS & AV	HP Dell

		Lenovo Portwell- Laxsons Avhis Technologies Advantech Technis Infosol
71	Operator work station with Windows OS & AV	HP Dell IBM Portwell- Laxsons Avhis Technologies Advantech Technis Infosol
72	Engineering Work station with Windows OS & AV	HP Dell IBM Portwell- Laxsons Avhis Technologies Advantech Technis Infosol
73	Laptop	Dell IBM Ausus Razer HP
74	Router	Moxa Siemens (Ruggedcom) Cisco Checkpoint Sophos Palo Alto
75	Modbus to TCP/IP converters	Moxa Siemens Schneider Electric Advantech Phoenix Contact HMS Anybus ICP DAS Westermo CMS
76	Multifunction A3/A4 Colour Laser printer	HP Brother Canon Epson Richo
77	UPS system	Emerson Vertiv India Fuji Electric Consult Neowatt Eaton Schneider Electric

		Siemens ABB / Hitachi Energy Delta Electronics India Legrand Socomec Toshiba Riello UPS
78	UPS DB	OEM of UPS
79	Optical Fiber Cables	Finolex Cables Ltd HFCL (Himachal Futuristic Communications Ltd.) Aksh Sterlite Polycab India Ltd KEI Industries Ltd Universal Cables Ltd
80	LAN cables	Tyco Sterlite Technologies (STL) Digisol RR Kabel Ltd. DLINK Polycab India Ltd. Finolex Cables Ltd Panduit India Belden India Legrand India Schneider Electric India CommScope India
81	Air Conditioner (5 Star energy efficiency)	Carrier Voltas Blue Star Hitachi Samsung LG Mitsubishi Heavy Industries O'General
82	FOTE Communication Equipment	As per Tender DTS
83	Phasor Measurement Unit (PMU)	As per Tender DTS
84	NIFPS System	CTR Vimal Fire Tectonicus Service, (Nashik) Indo tech
85	CCTV Camera & Monitoring System	Sony Bosch Security Systems India Honeywell Axis Communications India Hanwha Vision India (Wisenet)

		Milestone
86	Fire, Alarm Leak Dectection system	As per BESS OEM
87	Firewall	Fortinet Check Point Palo Alto SOPHOS
88	VoIP Phone	SLDC / GETCO Approved.
89	Fire Extinguishers	Cease Fire Kanex MinMax Safex Kanadia Fyr Fyter Zenith United Fire Equipments Intime Fire Appliances
C	**CIVIL ITEMS**	
90	TMT Rebar	SAIL TATA Steel RINL Jindal Panther or, equivalent of JSPL JSW
91	Cement (SRC/OPC/PPC)	ACC Ambuja J K Lakshmi UltraTech Sanghi Hathi Hi-Bond
92	Admixtures / Water proofing compounds / Hardener	Dr. Fixit Sika BASF Fosroc
93	Aluminium Sheet	Hindalco Jindal
94	Structural steel	Jindal Tata Steel
95	Metal cladding puff panel / Sandwich panel	Kingspan Jindal Sintex ThyssenKrupp Tata Blue Scope
96	Aluminium doors/windows/partition	Hindalco Banco Jindal
97	Hand Rail Stainless steel SS-304	Tata Steel Jindal SAIL
98	Vitrified tiles/ Ceramic tiles-premium class	Nitco Kajaria

		Asian RAK
99	Acid resistant tiles	Johnson Kajaria Somany
100	Glass	Saint-Gobain Modi Glass
101	Bricks / Bocks (Light Weight)	As approved by owner during detail engineering stage.
102	Rolling Shutter	As approved by owner during detail engineering stage.
103	Steel doors	TATA steel
104	Door / Window fixtures (like lock, handle, closer etc.)	Godrej Doma Kich Yale
105	Panic Bar / Push bar (with safety sign display sticker)	Dorma As approved by owner during detail engineering stage
106	Acrylic and emulsion paint, weather proofing paint	Asian Indigo Birla Opus Jotun India Berger
107	Putty	Birla Asian Berger
108	Acid /epoxy resistant paint	Fosroc Jotun
109	Fire proof Sealant	Sika, Fosroc, Hilti Fosroc Hilti
110	Non Shrink grout	Sika Fosroc
111	PVC Water stop/water bar	Sika Fosroc
112	CI / FRP / RCC Manhole cover	As approved by owner during detail engineering stage
113	False ceiling (Gypsum or Fiberglass board)	Armstrong Saint Gobain
114	Raised floor	As approved by owner during detail engineering stage
115	RCC pipe	As approved by owner during detail engineering stage. (as per B.I.S. standards)
116	GI pipe-class C heavy	Jindal Tata
117	GI fittings	Jindal Tata
118	PVC/CPVC pipes	Supreme Finolex Astral

119	Plumbing fixtures	Jaquar Kohler
120	Sanitary hardware	Jaquar Kohler
121	GI Sheet	SAIL TATA Jindal
122	Garattings / Floor Grills	Indiana

NOTES:

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

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

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