SCiB Lithium Ion Energy Storage Solution

*THIS GUIDE SPECIFICATION IS WRITTEN IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) MASTERFORMAT. THIS SECTION MUST BE CAREFULLY REVIEWED AND EDITED BY THE ARCHITECT OR THE ENGINEER TO MEET THE REQUIREMENTS OF THE PROJECT. COORDINATE THIS SECTION WITH OTHER SPECIFICATION SECTIONS IN THE PROJECT MANUAL AND WITH THE DRAWINGS.*

*WHERE REFERENCE IS MADE THROUGHOUT THIS SECTION TO “PROVIDE”, “INSTALL”, “SUBMIT”, ETC., IT SHALL MEAN THAT THE CONTRACTOR, SUBCONTRACTOR, OR CONTRACTOR OF LOWER TIER SHALL “PROVIDE”, “INSTALL”, SUBMIT”, ETC., UNLESS OTHERWISE INDICATED.*

*THIS SECTION IS WRITTEN TO INCLUDE THE 2018 MASTERFORMAT.*

**SECTION [26 33 19]**

**LITHIUM TITANATE BATTERY SOLUTION**

**PART 1 ‑ GENERAL**

1. **SUMMARY**
   1. **Scope:** Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for a Lithium Titanate battery solution as required for the complete performance of the work as specified herein and on related Drawings.
   2. **Section Includes:** The work specified in this Section includes, but is not limited to, a Lithium Titanate battery solution (also: “energy storage system”). The energy storage system shall operate in conjunction with a double conversion uninterruptible power supply (UPS) to provide power conditioning and backup power. The energy storage system shall consist of front-access battery cabinets, monitored Lithium Titanate battery modules, and electronics enabling communication with the UPS and building management systems, as described herein.
      1. The energy storage system shall consist of front-access battery cabinets containing low weight, long lifetime, energy dense Lithium Titanate battery modules.
      2. The Lithium Titanate battery cabinets shall be black.
      3. Each Lithium Titanate battery cabinet shall contain its own DC disconnect breaker rated to protect the battery strings within that enclosure.
      4. The battery cabinet will support top, bottom, and side cable access.
      5. Integrated battery monitoring system (BMS) shall be provided at the module and system level. Control power to the BMS shall be from a power supply internal to the battery cabinet. The power supply shall derive power from the output of the UPS.
      6. The energy storage system shall communicate with the UPS using dry contacts.
      7. The energy storage system shall be compatible with the following UPSs: Toshiba G9000 UPS. Other UPS models meeting the nominal voltage, charge voltage, and charge amperage requirements, charger on-off input signal communicated by dry contacts.
      8. The warranty on battery modules shall be twelve (12) years with included preventative maintenance every three (3) years for that time. All other mechanical and electronic components shall be warranted for three (3) years.
2. **REFERENCES**
   1. **General:** The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
   2. **Institute of Electrical and Electronics Engineers, Inc. (IEEE):**
      1. ANSI/IEEE C62.41, "Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits" (copyrighted by IEEE, ANSI approved).
   3. **International Organization for Standardization (ISO):**
      1. ISO 9001, "Quality Management Systems ‑ Requirements."
      2. ISO 14001, “Environmental Management Systems ‑ Requirements With Guidance for Use.”
   4. **Underwriters Laboratories, Inc. (UL):**
      1. UL 1973, "Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications" (copyrighted by UL, ANSI approved).
      2. UL 9540, " Standard for Energy Storage Systems and Equipment" (copyrighted by UL, ANSI approved).
      3. UL 1642, "Standard for Lithium Batteries" (copyrighted by UL, ANSI approved).
3. **SYSTEM DESCRIPTION**
   1. **Design Requirements:**

*INSERT APPLICABLE VALUES IN SUBPARAGRAPHS ABOVE AND BELOW.*

* + 1. The energy storage system shall be sized for [\_\_\_\_] minutes of runtime at the specified load for the UPS System.
    2. Voltage Range: 455-565VDC
  1. **System Characteristics:**
     1. **Battery Cabinet:** Each battery cabinet shall contain two (2) paralleled strings of battery modules. Cabinets may be paralleled with up to four (4) other cabinets for additional runtime using the internal direct bus connections. The maximum number of cabinets connected to a single UPS System shall be eight (8).
        1. **Capacity:** 250kW, 44.7kWh
        2. **Dimensions:** 34.1” W x 32.8” D x 80.6” H
        3. **Weight:** 1950lbs.
        4. **DC Disconnect Breaker Rating:** 600AT
        5. **Maximum Charge Current:** 32ADC
        6. **Operating Temperature:** 0 – 40°C
     2. **Battery Modules:**
        1. **Chemistry:** SCiB Lithium Titanate
        2. **Nominal Capacity:** 45Ah
        3. **Nominal Voltage:** 27.6V
        4. **Operating Voltage:** 18.0 – 32.4V
        5. **Dimensions:** 14.1” W x 7.4”D x 4.8” H (359mm W x 187mm D x 123mm H)
        6. **Discharge Rate:** Up to 6.2C (1C in single cabinet application)
        7. **Recharge Rate:** .71C

1. **QUALITY ASSURANCE**
   1. **Qualifications:**
      1. **Manufacturer Qualifications:** Manufacturer shall have experience in the design, fabrication, and installation of UPS systems and Lithium Titanate Batteries and be ISO 9001, ISO 14001, and OHSAS 18001 certified.
2. **PROJECT CONDITIONS**
   1. **Environmental:**
      1. **Operating Temperature:** 0 – 40°C
      2. **Storage Temperature:** ‑30 °C – 45°C
      3. **Relative Humidity:** 85% or less (no condensation)
3. **WARRANTY**
   1. **Factory Warranty:** The energy storage system shall be covered by a full parts and labor warranty from the manufacturer for a period defined below from date of installation or acceptance by the Owner. Startup must be performed by a factory authorized representative for warranty to apply.
      1. **SCiB 2P12S Battery Module (Type 3-23):** 12 years minimum
      2. **Non-battery Components:** 3 years minimum, includes Preventative Maintenance every 3 years for the duration of the battery warranty (12 years).
4. **MAINTENANCE**
   1. Preventative Maintenance and Maintenance contracts shall be available. Preventative Maintenance shall be performed by factory authorized service representatives.

**PART 2 ‑ PRODUCTS**

1. **COMPONENT DESCRIPTION**
   1. The energy storage system shall be comprised of a number of cabinets with sufficient capacity to provide backup power for a duration of [\_\_\_\_] minutes.
   2. Each cabinet shall contain two (2) battery strings consisting of (18) battery modules each.
   3. Each cabinet shall contain a 600AT DC disconnect breaker with appropriate auxiliary contacts for interface with the UPS module.
   4. The ESS shall have a hierarchical set of control systems consisting of the following:
      1. Cell Monitoring Unit (CMU) – cell-level battery monitoring contained on each module
      2. Battery Management Unit (BMU) – string-level battery management contained in each enclosure in the system
      3. Host Controller – system-level management which communicates with the UPS and transmits pre-defined information to the customer’s BMS
   5. Fuses shall be provided in a draw-out assembly for quick replacement after an overcurrent event.
2. **SYSTEM CONTROLS AND INDICATORS**
   1. **Battery Management System**
      1. The energy storage system shall have both integrated cell monitoring for management of cell charging and discharging and system level monitoring for system level fault reporting and communication of data to external devices.
   2. **Network Communication**
      1. **Protocol:** Modbus RTU
      2. **Accessible Parameters:**
         1. Host Status
         2. Cabinet Fault Status
         3. Left String Fault Status
         4. Right String Fault Status
         5. Warning Status
   3. **Enclosure LED Indicators**
      1. Enclosure shall be equipped with three (3) colored LEDs for annunciation of status and alarms:
         1. **Battery Ready (Green)**
         2. **Discharging (Amber)**
         3. **Fault (Red)**
   4. **Fault Events**
      1. Communication Lost (Host-to-Host or BMU-to-Host)
      2. Cell Under-Voltage
      3. Cell Over-Voltage
      4. Low State of Charge
      5. Over-Temperature
      6. Open Fuse
      7. Fuse Tray Open
      8. Battery Breaker Open
   5. **Interface with UPS**
      1. **UVR Signal** – UPS system shall provide a signal used to trip the battery cabinet breaker or prevent breaker closure when the UPS is powered down. Consult Factory for use with UPS units without UVR signal.
      2. **Breaker AUX Signal** – battery cabinet breaker shall utilize a signal to indicate the status of the breaker to the UPS for control of the charger circuit.
      3. **Charger Stop Signal** – The host controller shall supply a signal to the UPS system to start or stop the UPS charger. Removal of the signal shall cause the UPS to start charging the ESS batteries automatically.
3. **ENCLOSURE**
   1. **Cable Access:** Top, Bottom, Side capable.
   2. No Rear or Side Clearance Required

**PART 3 ‑ EXECUTION**

1. **INSTALLATION**
   1. **General:** Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer’s written recommendations, and as indicated on the Drawings.
   2. **Factory‑Assisted Start‑Up:** A factory product trained service provider shall perform start-up and inspections per training test procedures.

**END OF SECTION**