SPECIAL SPECIFICATION

SECTION 16261-S

UNINTERRUPTIBLE POWER SUPPLIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes uninterruptible power supplies, including inverter systems, battery cabinets, and maintenance bypass panels.

B. Section includes battery monitoring system.

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE 1184 - Guide for the Selection and Sizing of Batteries for Uninterruptible Power Systems.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

2. NEMA PE 1 - Uninterruptible Power Systems.

C. Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power. Distribution Equipment and Systems.

1.03 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Indicate battery rack dimensions; battery type, size, dimensions, and weight; detailed equipment outlines, weight, and dimensions; location of conduit entry and exit; single-line diagram indicating metering, control, and external wiring requirements; heat rejection and air flow requirements.

1. Include dimensioned plan views and elevations.

2. Include all relevant electrical diagrams including schematic and interconnection diagrams for power, signal, and control wiring.

B. Product Data: Submit catalog data showing all standard features, dimensions, weights, listings and product labels, material types, finishes and clearly indicating which optional features will be

provided.

1. Include amperage ratings, voltage, over-current protective device ratings, AIC ratings.

2. Where multiple sizes are listed, indicate sizes to be used.

C. Where multiple products are shown on the same page, indicate which products to be used.

D. Source Quality-Control Test Reports.

1. Certified summary of prototype-unit test report.

2. Certified factory test report on unit to be shipped for this project showing compliance with all manufacturer tests.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of electrical equipment and record actual circuiting arrangements.

B. Operation and Maintenance Data:

1. Provide product data as defined under submittals.

2. Provide manufacturer's installation and maintenance instructions for normal operation, routine maintenance and testing, and emergency maintenance procedures.

3. Submit spare parts listing; source of replacement parts and supplies; and recommended maintenance procedures and intervals.

C. Field Quality-Control Test Reports: Report certified by field testing agent indicating results of performance testing required in Part 3 and/or on plans.

1.05 QUALIFICATIONS

A. Manufacturer: Provide specified product from specified manufacturer.

B. Supplier: Authorized distributor

C. Installer: A state licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications, required by core, or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

D. Start Up and Testing Agency: A factory trained engineer with the documented experience and properly calibrated, fully functioning equipment to conduct the testing required by the specifications, plans and code, and is acceptable to the authority having jurisdiction.

1.06 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

C. All products shall be designed and manufactured in full compliance with the requirements of NFPA 111.

1.07 WARRANTY

A. Provide manufacturer's standard form clearly stating that manufacturer agrees to repair or replace equipment, materials, and associated auxiliary components that fail or deteriorate within the specified warranty period.

B. Warranty Period: five(5) year from the date of substantial completion.

C. Contractor shall provide provisions to trickle charge the batteries immediately upon their delivery to site or install and energize within the manufacturer's warranty specified time.

D. Contractor shall contact manufacturer before making any repairs or alterations to any of the components.

1.08 DELIVERY STORAGE AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.

B. Maintain factory wrapping or provide additional canvas or plastic cover if required to be stored on site. Follow all manufacturer recommendations for humidity and max/min temperatures for storing electrical equipment.

C. Deliver batteries and charge per manufacturer's instructions. See warranty section above.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not store or install unless temperature is maintained between 32 degrees F and 104 degrees F, at relative humidity less than 95 percent (non-condensing).

1.010 MANUFACTURER SERVICE PLAN

A. Provide 5 year, 7x24 PowerTrust service plan

B. Features

1. Parts and labor for electronics and batteries

2. 7x24 On Site corrective Maintenance

3. 8 hour response time

4. 1 per year battery preventative maintenance visit

5. 1 per year 7x24 UPS preventative maintenance visit

6. eNotify Remote Monitoring Service

PART 2 - PRODUCTS

2.01 STATIC UNINTERRUPTIBLE POWER SUPPLY

A. Manufacturer:

1. Eaton Powerware 9395 550KVA/495KW

B. Product Description: PWM Inverter with Battery Cabinet, Static Bypass, and three breaker maintenance bypass panel; capable of paralleling; N+1 redundancy; field upgradeable; 8x40 LCD display.

C. System Ratings and Operating Characteristics:

1. System Continuous Rating: As indicated over entire battery voltage range at specified power factor. Maintain output voltage within specified limits at load from full load to no-load.

2. Voltage Rating: 480 volts, 3 phase in/out

3. Input Voltage Operating Range: Plus 10 percent, minus 15 percent

4. Input Frequency Operating Range: 60 Hz. plus or minus 5 Hz.

5. Power Factor: 0.99 minimum

6. Harmonic Distortion of Input Current Wave Form: 4 percent maximum.

7. Output Voltage Regulation: 1 percent

8. Output Voltage Adjustment: Plus or minus 10 percent.

9. Frequency Adjustment: Plus or minus 5 Hz.

10. Output Voltage Harmonic Distortion: 2% maximum for linear loads, 5% for nonlinear loads.

D. Design:

1. Inverter Type: Pulse-width modulated with IGBT switching.

2. Designed for capacity expansion by addition of parallel modules in field with minimum

downtime.

3. Rectifier/Charger Capacity: Sufficient to supply full load to inverter while recharging fully-discharged battery to 95 percent of full capacity in four hours or less; and within input current limits specified.

4. Furnish means for on-line testing of UPS, including test points to allow adjusting and servicing. Furnish means for testing static switch while load is bypassed to utility.

5. Mean Time Between Failures: 60,000 hours, minimum.

6. Cooling: Forced convection or natural convection. Furnish forced air cooled unit with redundant cooling so failure of one cabinet cooling fan or fan circuit does not affect continued operation at full load and ambient temperature of 77 degrees F or lower.

E. Controls and Monitoring:

1. Face mounted 8x40 LCD display

2. PowerXpert Gateway 2000 Card: Web enabled monitoring for power quality data, data/event logging, Modbus TCP/IP and SNMP v3 support

3. Remote Monitor Panel (RPM II)

4. HotSync CAN Bridge Card

2.02 MANUAL BYPASS PANEL

A. Manufacturer:

1. Eaton Powerware 9395 Maintenance Bypass Module

B. Product Description: A three circuit breaker panel with bussing arranged per one line diagram.

C. System Ratings and Operating Characteristics:

1. Voltage Rating: 480 volts, 3 phase in/out

2. Amp Rating: 1,000A

3. AIC Rating: 65KAIC

D. Design:

1. Provide with maintenance bypass breaker (MBP) with line side bused to panel main incoming feeder terminals and load side bused to main outgoing feeder terminals for load connection. MBP shall transfer load from the UPS to the bypass input feeder

2. Provide with bypass input breaker (BIB) with line side bused to same panel main incoming

feeder terminals as MBP and load side bused to dedicated outgoing feeder terminals for output to UPS. BIB shall provide input power to the UPS static bypass.

3. Provide with maintenance isolation breaker (MIS) with line side UPS incoming feeder terminals and load side bused to the same dedicated outgoing feeder terminals as the MBP for output to UPS.

4. MBP and MIS shall be provided with key interlock system to allow only one of these two breakers to be energized at any one time.

5. Provide with red engraved panel indicating operational procedures. SNL to provide text for label.

2.03 BATTERY

A. Storage Battery: Valve regulated led acid AGM or Gell Cell, 3 strings for 6 minutes at 495kW.

B. Provide three(3) Eaton Powerware Remote battery cabinets.

2.04 BATTERY MONITORING SYSTEM

A. Product Description: Cellwatch iBMU, control units, and data collection modules for each battery.

B. Temperature probe for each battery cabinet

C. Monitor connected to iBMU. Mount monitor and iBMU adjacent to inverter cabinet.

D. Manufacturer’s mounting kit

E. Manufacturer Services

F. Provide 1 year cellwatch.net access

G. Provide manufacturer installation.

2.05 SPARE PARTS

A. Provide 1 spare parts “A” kit

B. side panel dress skins as required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify HVAC Systems are operational to maintain specified environmental conditions.

3.02 EXISTING WORK

A. Disconnect and remove existing uninterruptible power supplies and accessories.

B. Contractor shall be responsible for removal and disposal of all components not requested by owner. Contractor to coordinate with owner to determine what components, if any, are to be returned to owner and transport said components to owner specified location at SNL.

3.03 INSTALLATION

A. Install new inverter and battery cabinets on existing concrete pad.

1. Note that existing pad must be expanded to accommodate new UPS

2. Provide rebar reinforcement of pad expansion

3. Drill into existing pad and provide dowels to secure new and existing sections of pad.

B. Seismically brace UPS and battery cabinet per IBC 2009. Refer to Seismic Protection Specification.

C. Ground and bond all components

D. Provide ground conductor from US1 and bond to cabinet.

E. Provide additional ground conductor in conduit to building steel via the existing ground plate located across from the battery cabinet. Refer to plans

3.04 FIELD TESTING AND STARTUP

A. Contract a manufacturer’s factory trained engineer to perform start-up of the UPS system.

B. Inspect and test in accordance with NETA ATS.

1. Perform all cable tests listed in section 7.6

2. Perform all circuit breaker tests listed in section 7.6. except primary current injection test.

3. Perform all battery tests listed in section 7.18.

4. Perform all UPS tests listed in section 7.22

C. Verify specification performance criteria.

D. Measure and record battery discharge and recharge times.

E. Simulate fault in each system component and utility power.

F. Operate unit at 77 degrees F for eight hours.

G. Manufacturer’s Installation Instructions

1. Follow all requirements and procedures set forth in the manufacturers installation instructions manual

2. Perform all tests recommended by manufacturer.

3. Review and complete the manufacturer’s installation checklist

3.05 ADJUSTING

A. Adjust output voltage to within 1 percent of nominal.

B. Adjust output frequency to within 0.6 percent of nominal.

3.06 DEMONSTRATION AND TRAINING

A. Furnish 4 hours of instruction each for two persons, to be conducted at project site with manufacturer's representative.

-END OF SECTION-

SPECIAL SPECIFICATION

SECTION 16413-S

MANUAL TRANSFER SWITCHES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes transfer switches in individual enclosures.

B. Nomenclature Clarification: Note that the transfer switch shall be manually initiated, but electrically operated. Throughout the documentation, the transfer switch is referred to as a manual transfer switch and by the abbreviation MTS. This should not be construed to mean a device that is hand switched between sources.

1.02 REFERENCES AND STANDARD

A. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. UL 1008 - Transfer Switch Equipment.

D. NFPA 70 – National Electric Code

E. NFPA 101 0 Emergency and Standby Power Systems

F. IEEE Standard 446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

1.03 SUBMITTALS

A. Shop Drawings: Manufacturer or contractor prepared drawings showing all relevant dimensions, weights, electrical and mechanical connection requirements, conduit entry points, assembly requirements, lifting requirements, lifting points, and required clearances.

1. Include dimensioned plan views and elevations.

2. Include all relevant electrical diagrams including schematic and interconnection diagrams for power, signal, and control wiring.

B. Product Data: Submit catalog data showing all standard features, dimensions, weights, listings and product labels, material types, finishes and clearly indicating which optional features will be provided.

1. Include amperage ratings, voltage, over-current protective device ratings, AIC ratings.

2. Where multiple sizes are listed, indicate sizes to be used.

3. Where multiple products are shown on the same page, indicate which products to be used.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of electrical equipment and record actual circuiting arrangements.

B. Operation and Maintenance Data:

1. Provide product data as defined under submittals.

2. Provide manufacturer's installation and maintenance instructions for normal operation, routine maintenance and testing, and emergency maintenance procedures.

3. Submit spare parts listing; source of replacement parts and supplies; and recommended maintenance procedures and intervals.

C. Field Quality-Control Test Reports: Report certified by field testing agent indicating results of performance testing required in Part 3 and/or on plans.

1.05 QUALIFICATIONS

A. Manufacturer: Provide specified product from specified manufacturer.

B. Supplier: Authorized distributor

C. Installer: A state licensed electrician with documented experience installing all equipment specified here in shall directly supervise all work. Where noted in the specifications, required by core, or required by the manufacturer, installer shall be a manufacturer trained and/or certified installer of the specific product to be installed.

D. Testing Agency: An agency with the documented experience and properly calibrated, fully functioning equipment to conduct the testing required by the specifications, plans and code, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and is acceptable to the authority having jurisdiction.

1.06 QUALITY ASSURANCE

A. Source Limitations: All components required for a complete functioning system as described here in shall be obtained through one source from a single manufacturer.

B. Listing and Labeling: Where required, all electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for the intended use. Testing agency shall be UL unless noted otherwise or pre-approved by owner and AHJ.

C. The complete transfer switch shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

1.07 WARRANTY

A. Provide manufacturer's standard form clearly stating that manufacturer agrees to repair or replace equipment, materials, and associated auxiliary components that fail or deteriorate within the specified warranty period.

B. Warranty Period: five(5) years from the date of substantial completion

1.08 DELIVERY STORAGE AND HANDLING

A. Store in clean, dry space located above grade and protect from dirt, water, construction debris, traffic, freeze, and where applicable, deterioration from sun light.

B. Maintain factory wrapping or provide additional canvas or plastic cover for all large electrical equipment. Follow all manufacturer recommendations for humidity and max/min temperatures for storing electrical equipment.

PART 2 - PRODUCTS

2.01 NON AUTOMATIC TRANSFER SWITCH

A. Manufacturers:

1. ASCO 386

B. Product Description:

1. Electrically operated, mechanically held transfer switch.

2. 4 Pole (Neutral) Switching

3. Electrical Operator: Momentarily energized, single solenoid mechanism. The switch shall be mechanically interlocked to ensure only two possible positions, normal or emergency.

4. Switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized.

5. All main contacts shall be silver composition.

6. Switches shall have segmented, blow-on construction for high withstand capability and be protected by separate arcing contacts.

7. All contacts shall be inspectable without removing power and replaceable without removing power conductors or bus bars.

8. All components shall be rated for continuous duty and repetitive switching.

9. Neutral transfer contacts shall be fully rated.

10. Transfer switch design shall allow for future conversion to automatic operation.

C. Microprocessor Controller

1. Provide a single, built in microprocessor with a serial communication port.

2. Panel shall be capable of operating in ambient conditions.

3. Controller shall be arranged for manually actuated electrical operation with provisions for remote operation.

4. Controller shall have provisions for ensuring a minimum of one phase of source being transferred to is at 85% nominal voltage or higher.

D. System Rating:

1. 800A, 480V, 3 phase, 4 pole.

2. Withstand Current Rating: 65,000 rms symmetrical amperes, when used with molded case circuit breaker.

3. Service Conditions: NEMA ICS 10.

4. Altitude: 6,600 feet above sea level.

E. Product Features:

1. Indicating Lights: Mount in cover of enclosure to indicate NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, switch position.

2. Transfer Switch Auxiliary Contacts: one closed when connected to normal source and one closed when connected to alternate source.

3. Selective Load Disconnect: Double throw contact to operate after an adjustable time delay to selectively disconnect specific loads upon transfer. Rating shall be 5A min at 24VDC or 120VAC. Adjustment range shall be from 20 second before to 20 second after transfer.

4. RS485 interface for remote monitoring

F. Enclosure:

1. Enclosure: ICS 10, Type 1

2. Finish: Manufacturer's standard gray enamel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install housekeeping pads.

B. Seismically brace per IBC 2009. Refer to Seismic Protection Specification.

C. Install engraved plastic nameplates.

D. Ground and bond MTS.

3.02 FIELD QUALITY CONTROL

A. Inspect and test in accordance with the requirements for the UPS acceptance test.

B. Perform all manufacturer recommended inspections and tests.

C. Perform all cable tests listed in NETA ATS section 7.6

END OF SECTION