SECTION 26 33 53

STATIC UNINTERRUPTIBLE POWER SUPPLY

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes static uninterruptible power supply equipment larger than 10 KVA but under 300 KVA.

1.2 REFERENCES


C. NEMA 250 (National Electrical Manufacturers Association) – Enclosures for Electrical Equipment (1000 Volts Maximum).


1.3 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

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

C. Product Data: Submit catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.

D. Manufacturer’s Field Reports: Indicate inspections, findings, and recommendations.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout and turnover procedures.
B. Operation and Maintenance Data: Submit description of operating procedures; servicing procedures; list of major components; recommended remedial and preventive maintenance procedures; and spare parts list.

1.5 QUALIFICATIONS.

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment from extreme temperature and humidity by storing in a conditioned space.

B. Protect equipment from dust and debris by wrapping unit in dust tight cover and storing away from construction activity.

C. Deliver batteries no sooner than (______) days before charging.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not store or install unless temperature is maintained between 32°F (0°C) and 104°F (40°C), at a relative humidity less than 95 percent (non-condensing).

1.8 EFFICIENCY

A. Desired efficiency is greater than 97%.

B. Include efficiency versus output curves with proposal.

1.9 WARRANTY

A. Section 01 77 00 – Execution Requirements: Product warranties and product bonds.

B. Provide 5 year manufacturer warranty.

1.10 MAINTENANCE SERVICE

A. Section 01 77 00 – Closeout and turnover procedures.

B. Provide service and maintenance of uninterruptible power supply for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 STATIC UNINTERRUPTIBLE POWER SUPPLY

A. Manufacturers:

1. Best Power Technology Model (__________).
2. Liebert Corp. Model (______).  
3. Square D Model (__________).  

B. Product Description: (Nonredundant) (Parallel redundant) (Dual redundant) uninterruptible power supply with reverse transfer.  

C. System Ratings and Operating Characteristics:  
   1. System continuous Rating: As indicated on Drawings, ((____) KVA, (____) KW), over entire battery voltage range at specified power factor. Maintain output voltage within specified limits at any load from full load to no-load.  
   2. Battery Capacity: Capable of operating at full load for (___) hours. As indicated on Drawings. As Scheduled.  
   4. Input Voltage Operating Range: (+/- 10) (_____ percent.  
   5. Input Frequency Operating Range: (60) (____) Hz. (+/- 3) (____) Hz.  
   6. Current Walk-in: 25 to 100 percent in fifteen seconds.  
   7. UPS Power Factor Over Full Range of Loads and Input Voltage: 74 to 100 percent, lagging.  
   8. Harmonic Distortion of Input current Wave Form: 5 percent maximum at full load.  
   9. Output voltage regulation:  
      a. +/- (_____ percent for balance load, full range of DC input and no load to full load variations.  
      b. +/- (_____ percent for 50 percent unbalanced load, full range of DC input and no load to full load variations.  
      c. +/- (_____ percent during maximum overload of the system.  
   10. Output Voltage Adjustment: +/- (______) percent.  
   11. Output Free Running Frequency: (60) (______) Hz +/- (0.5) (______) percent.  
   12. Frequency Adjustment: +/- (______) Hz.  
   13. Output Harmonic Distortion: Maximum (5) (______) percent rms total harmonic distortion (THD) and maximum (3) (______) percent any single harmonic, at rates frequency and voltage, from 10 percent load to full load and over battery voltage range, measured into a linear load.  
   14. Voltage Transient Response for Application of 0 to 50 Percent, 50 to 100 Percent, 100 to 50 Percent, and 50 to 0 Percent Step Loads and Transfer To and From Bypass Line:  
      a. Plus 8, minus 10 percent for maximum of 8.3 milliseconds.  
      b. +/- 5 percent for maximum of 25 milliseconds.  
      c. +/- 3 percent for maximum of 50 milliseconds.  
      d. (_____ percent for maximum of (______) milliseconds.  
      e. Recovery to steady state within (100) (____) milliseconds after any out-of-tolerance variation.  
   16. Phase Displacement:
a. 120 +/- (1) (_____) degrees for balanced loads.
b. 120 +/- (4) (_____) degrees for 50 percent unbalanced loads.
c. 120 +/- (______) degrees for (______________________).

17. Three-phase Overload Ratings:
a. (1000) (________) percent for 5 cycles; via static switch.
b. (150) (_______) percent for (10) (_______) seconds.
c. (125) (_______) percent for (10) (_______) minutes.
d. (________) percent for (_______) minutes.

18. Output Current Limit: (150) (_______) percent of rated output current.
19. Voltage Unbalance: (3) (________) percent maximum line-line with 1000 percent load unbalance.
20. Efficiency: (______) percent at full load, (_______) percent at (______) percent load, minimum. Measure efficiency of unit including battery and isolation transformer losses.

D. Design:

1. Inverter Type: (Pulse-width modulated) (Ferroresonant transformer) (Step-wave design) (__________).
2. Designed for capacity expansion by addition of parallel modules in field with minimum downtime.
3. Rectifier/Charge 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 the input current limits specified.
4. Provide means for on-line testing of UPS, including test points to allow adjusting and servicing. Provide 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) (Provide forced air cooled unit with redundant cooling so that failure of any one cabinet cooling fan or fan circuit will not affect continued operation at full load and ambient temperature of 77 degrees F (25 degrees C) or lower).
7. Operate battery floating, isolated from the UPS AC input and AC output. The battery may be resistance grounded through 5,000 – 10,000 ohms for the purpose of ground fault sensing.
8. Do not use continuous moving parts or electron tubes. Accomplish power switching using semiconductor devices.
9. Construct equipment so each power component can be replaced without a soldering iron or special tools.
10. Use front-panel removable plug-in control modules.

E. Controls:

1. AC input circuit breaker.
2. “Inverter operate” switch to initiate inverter operation.
3. “Inverter standby” switch to cause inverter to cease operation.
4. “Static switch transfer” switch to permit manual actuation of static transfer switch.
5. “Static switch lock-out” switch to inhibit automatic retransfer of load to inverter.
8. Static switch preferred input circuit breaker.
9. Static switch output circuit breaker.
10. Static switch bypass circuit breaker.
11. Controls for maintenance bypass switch.
12. (___________)

F. Indicators:

1. “Inverter synchronized to utility”.
2. “Load connected to utility”.
3. “Static transfer switch inhibited”.
4. “High/low DC voltage”.
5. “Overtemperature”.
6. “Inverter output overload”.
7. (____________).

G. Meter: User (1) (_______) percent accuracy meters to indicate the following:

1. Rectifier/charger DC voltage and current.
2. Utility, inverter output, and load AC voltage.
3. Load AC current.
4. Inverter output and utility frequency.
5. UPS output watts.
6. (______________). 

H. Wall-mounted Alarm Panel: (Surface) (Flush) mounted annunciator panel with the following monitoring and alarm functions:

1. “Utility power available”.
2. “Utility bypass power available”.
3. “Inverter output available”.
4. “Inverter synchronized to utility”.
5. “Load connected to inverter output”.
6. “Load connected to utility bypass power (alarm)”. 
7. “Static transfer switch inhibited (alarm)”. 
8. “High/low DC voltage (alarm)”. 
9. “Overtemperature (alarm)”.
10. “Inverter output overload (alarm)”.
11. Audible alarm (sounds when any of the above alarm conditions occur).

I. Fabrication:

1. Electroplate brackets and securing hardware with corrosion resistant material. Secure bolts, studs and nuts with lock washers.
2. Identify internal wiring at each end of conductors. Provide cabinet grounding lug.
3. Conversion Equipment Enclosure: NEMA 250, Type 1 enclosure allowing access from front for servicing adjustments and connections. Access through hinged door equipped with tumble lock and latch handle. Equip cabinet for fork truck lifting.

4. Equip air inlet with permanent type filters and pressurize cabinet, or use gaskets around door and panel opening to prevent entry of dirt.

5. Cabinet finish: Primed and painted inside and outside with suitable semi-gloss enamel.

2.2 BATTERY

A. Storage Battery: (Lead calcium) (_____ ) heavy duty industrial battery, designed for auxiliary power service. Provide battery with impact resistant plastic case. Provide cells with explosion proof vents clear containers, and ample space for plate growth without stressing container and cover.

B. Ampere-Hour Rating: Sized in accordance with IEEE 1184.

C. Battery Racks: Maximum of three-tier, all steel construction, with plastic insulating rails at all points of contact with the battery case. Paint racks with acid resistant paint.

2.3 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of components and completed UPS assembly.

B. Make completed UPS available for inspection at manufacturer’s factory prior to packaging for shipment. Notify Owner at least seven days before inspection is allowed.

C. Allow witnessing of factory inspections and tests at manufacturer’s test facility. Notify Owner at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 33 00 – Administrative Requirements: Coordination and project conditions.

B. Verify HVAS Systems are operational to maintain specified environmental conditions.

3.2 EXISTING WORK

A. Disconnect and remove abandoned uninterruptible power supplies and accessories. All existing uninterruptible power supplies which are to be reused or reinstalled shall be cleaned and repaired.
3.3 FIELD QUALITY CONTROL

A. Section 26 08 00 – Electrical Systems Acceptance Testing
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.22.
D. Verify specification performance criteria.
E. Measure battery discharge and recharge times.
F. Simulate fault in each system component and utility power.
G. Operate unit at 77 degrees F (25 degrees C) for eight hours.
H. Perform other tests as recommended by manufacturer.

3.4 MANUFACTURER’S FIELD SERVICES

A. Section 26 08 00 – Electrical Systems Acceptance Testing.
B. Prepare and start up UPS.

3.5 ADJUSTING

A. Adjust output voltage to within (1) (_______) percent of nominal.
B. Adjust output frequency to within (0.6) (______) percent of nominal.

3.6 DEMONSTRATION AND TRAINING

A. Provide (______) hours of instruction each for (two) (_________ ) persons, to be conducted at (project site with manufacturer’s representative) (manufacturer’s training facility. (Include travel and living expenses for Owner Personnel). )

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 77 00 – Execution Requirements: Protecting installed construction.

END OF SECTION