EMERALD POWER

“Clean Power for a Greener Tomorrow”

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# UPS Service

## Semi-Annual Service

* Perform a complete visual inspection of all internal sub-assemblies, wiring harnesses, contactors, cables, and major components.
* Check for proper clearance around the unit.
* Perform temperature checks on all breakers, connections, and associated controls. Report all high temperature areas.
* Check air filters for cleanliness; clean or replace.
* Check module(s) for the following, as possible, unit dependent, shutdown may be required:
  + Rectifier and inverter snubber circuit board discoloration.
  + Power capacitors for swelling or leakage.
  + Capacitor vent caps extruded more than 1/8”.
  + Fans for proper operation.
  + Lubricate and check bearings for abnormal condition, as applicable, where possible .
* Record all meter readings and calibrate as necessary, where possible.
* Measure and record phase-to-phase input, output, bypass and battery voltages and currents, where possible.
* Review alarm log/history for any irregular activity, where possible .
* Verify remote status panel operation, as applicable.
* Measure and record harmonic trap filter currents, where possible .
* Review system performance with customer to address any questions and to schedule any repairs.
* Implement manufacturer field change notices, as possible .
* Perform functional system test upon customer approval.
* Provide inspection report, with recommendations, to Customer within 7 to 10 business days .

## Annual Service consists of all steps included with Semi-Annual Service, plus:

* Check the inverter and rectifier snubbers for discoloration or damaged wiring.
* Check all contacts to ensure secure connections.
* Verify all connections show no signs of discoloration.
* Check fuses on the DC capacitor deck for continuity, as applicable .
* Clean interior and exterior of unit.
* With customer approval, perform operational test of the system including unit transfer and battery discharge.
* Measure and calibrate, as necessary, where possible, all electronics to system specifications .
* Measure and record all low-voltage power supply levels.

*NOTE 1: Preventative Maintenance may require placing the Critical Load onto Maintenance Bypass to ensure electrical integrity.*

*NOTE 2: While air filters are covered by the terms of the full-service contract, we recommend that customers check them monthly for cleanliness and replace as necessary*

*NOTE 3: Preventative Maintenance on System Control Cabinet, Power Tie, Breaker Cabinets, Load Bus Sync, or Maintenance Bypass Cabinets, if included on the Schedule of Equipment, utilizes a separate scope of work.*

*NOTE 4: Some checks are not applicable to all UPS brands/models.*

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# VRLA (Sealed) Battery Service

## All tasks listed below performed by MC Dean Critical Power Group in accordance with IEEE Standard (Valve Regulated Lead Acid Batteries) and/or manufacturer’s specifications.

**Semi-Annual or Quarterly Service**

* Measure and record VDC & VAC of jar/cell (cell #1 + post to frame ground; frame ground to post of last cell in string)
* Measure and record overall system DC voltage and current levels
* Measure and record overall AC ripple voltage and current
* Measure and record each cell terminal voltage (DC)
* Measure and record the cell/unit internal ohmic measurement on 100% of string and preserve data for trending
* Measure and record ambient room temperature
* Measure and record temperature of all negative posts
* Check jar and cover for signs of leakage
* Check for corrosion on terminal post and connector
* Check general appearance and cleanliness of battery room and batteries
* Review Customer battery maintenance logs and add maintenance entry
* Perform safety checks:
  + Confirm proper warning/hazard labels
  + Confirm proper operational information, placards, and labeling
  + Check safety equipment and supplies for proper amount and location
* Provide inspection report with recommendations to customer.

## Annual Service consists of all steps included with Semi-Annual/Quarterly Service, plus:

* Torque battery to manufacturers specification (as needed if connection resistance measures greater than 20% of average)
* Clean and re-secure all battery terminals and jumper connections, as applicable (up to 20%)
* Clean and neutralize jar and rack/cabinet, as applicable
* For strings with battery packs, that measure below 20% of the average offline VDC should be further investigated for defective jars

*NOTE 1: Preventative Maintenance may require placing the Critical Load onto Maintenance Bypass to ensure electrical integrity.*

*NOTE 2: PM pricing is based on standard string configuration. Upon inspection, should the number of batteries or strings change, pricing will be adjusted accordingly.*

*NOTE 3: Corrective Maintenance, not covered by the terms of the Service Contract, will be billed at current Time & Materials rates.*

*NOTE 4: If battery is attached to a DC Plant, an ohmic battery test instrument is required to obtain cell resistance impedance or conductance.*

*NOTE 5: Scope of Work will be site specific and subject to change to accurately reflect equipment onsite.*