

Performance Testing Scope of Work Attachment L-5

This scope of work is shared by UPS, Eaton DC, Eaton PDU/PDR/RPP/STS, Flywheel, Non Eaton UPS and Distributed Bypass. The following is an outline of general procedures and tests, if applicable, that are normally performed by Field Service Personnel during the course of Performance Testing. All checks and processes may not be applicable to all equipment models. Method of procedure is written assuming a UPS is being tested.

LOAD BANK

Eaton will supply a load bank and a technical resource to test the UPS's performance at various load steps. It is important to locate the load bank in an area suitable for heat rejection. 50 feet of cabling will be provided to position the load bank in an area where heat can safely be dissipated away from sensitive equipment. Additional cabling can be added upon request to allow heat to dissipate in a suitable location. A certified electrician is required to make connections from the load bank to the UPS before testing. It is the responsibility of the electrician to unload/load the load bank and layout/pickup cable associated with the load bank.

IR SCAN

During the course of the testing an infrared (IR) camera will be used to identify any hotspots within the UPS and battery cabinets that show a higher temperature than normal. Any visible hotspots will be noted, and the actual temperatures are recorded for future reference. Thermographs (infrared photographs) will be taken and included in a subsequent written report.

PQ METER

During the course of the testing a PQ metering device will be used to record voltages, currents, and harmonic content at the output of the UPS. Any irregularities will be noted and included in a subsequent written report.

METHOD OF PROCEDURE

1. Verify the electrical infrastructure can support both critical load and the artificial load from the load bank simultaneously.
2. Receive approval from the electrician and/or site personnel to proceed with testing based on the infrastructure verification.
3. Transfer critical load to bypass.
4. Transfer critical load to maintenance bypass (if applicable).
5. Shut down UPS module(s)
6. Lockout tag-out performed (if applicable).
7. Electrician connects load bank to the output of the system.
8. Restart UPS module(s) and transfer to system normal.
9. Apply 50% load for a duration of one hour.
10. Perform IR scan to identify any hotspots
11. Observe the voltage, current, power regulation, harmonic content and the like for abnormalities.
12. Apply 100% load for a period of 3 hours.
13. Perform IR scan to identify any hotspots
14. Observe the voltage regulation, harmonic content and the like for abnormalities with PQ Meter.
15. Perform a battery discharge (for up to 4 minutes is recommended) by opening the rectifier input to the UPS system.



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16. Perform IR scan to identify any hotspots during the battery discharge.
17. Monitor the UPS operating parameters during the battery discharge.
18. Restore rectifier input to the UPS system and allow for battery recharge.
19. Transfer UPS system to bypass.
20. Transfer UPS system to normal.
21. Repeat transfer 3X.
22. Transfer UPS to bypass.
23. Remove load from load bank.
24. Isolate power to load bank and electrician should remove connections to load bank.
25. Remove lockout tag-out (if applicable).
26. Transfer load from maintenance bypass back to bypass.
27. Transfer critical load to normal.
28. Procedure is complete.

A report shall be provided to the customer documenting test results.