

## Functional Performance Test

**[Project Name]**

System: **Electrical**

Service: **Static Uninterruptible Power Supply**

<b>Functional Performance Test</b>	<b>Pass</b>	<b>Fail</b>	<b>Remarks</b>
<b>FPT Test Prerequisites</b>			
Comply with manufacturer's written instructions. *			
Inspect interiors of enclosures, including the following: <ul style="list-style-type: none"> <li>• Integrity of mechanical and electrical connections.</li> <li>• Component type and labeling verification.</li> <li>• Ratings of installed components.</li> </ul>			
Inspect batteries and chargers according to requirements in NETA Acceptance Testing Specifications. *			
Factory test complete UPS system before shipment. Use simulated battery testing to include: Full-Load test, Transient-load response test, Overload Test and Power Failure test. Test Result Report provided. (Reference Specification 263353-2.12.A,B)			
Record of Test and Inspections (Reference Specification 263353-3.02.D)			

<b>Automatic Operation</b>			
Automatic operational features tested*			
If normal power fails, energy supplied by the battery through the inverter continues supply-regulated power to the load without switching or disturbance.			
When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source before transferring the load.			
If the battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to float-charge mode.			

<b>Manual Operation</b>			
Manual operational features tested*			
Turning the inverter off causes the static bypass transfer switch to transfer the load directly to the normal ac supply circuit without disturbance or interruption.			
Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.			

<b>External Maintenance Bypass/Isolation Switch Operation:</b>			
Bypass/Isolation features tested*			

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Switch is interlocked via an SKRU system so that it cannot be operated unless the static bypass transfer switch is in the bypass mode.			
Full Isolation: Load is supplied, bypassing the UPS. Normal UPS ac input circuit, static bypass transfer switch, and UPS load terminals are completely disconnected from external circuits.			
Maintenance Bypass: Load is supplied, bypassing the UPS. UPS ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.			
Normal: Normal UPS ac supply terminals are energized and the load is supplied through either the static bypass transfer switch and the UPS rectifier-charger and inverter, or the battery and the inverter.			

<b>Performance Requirements - Inverter is switched to battery source.</b>			
System protective functions tested*			
<u>Minimum Duration of Supply:</u> If battery is sole energy source supplying rated full UPS load current at 80 percent power factor, duration of supply is 7 minutes.			
<u>Overall UPS Efficiency:</u> Equal to or greater than 90 percent at 100 percent load.			
<u>Maximum AC Output-Voltage Regulation for Loads up to 50 Percent Unbalanced:</u> Plus or minus 3 percent over the full range of battery voltage.			

<b>Controls and Indications</b>			
Quantitative indications shall include the following: <ul style="list-style-type: none"> <li>• Input voltage, each phase, line to line</li> <li>• System output voltage, each phase, line to line</li> <li>• System output current, each phase</li> <li>• System Input and output frequency</li> <li>• Battery current and direction (charge/discharge)</li> </ul>			
Basic status condition indications shall include the following: <ul style="list-style-type: none"> <li>• Normal operation .....</li> <li>• Load-on bypass.....</li> <li>• Load-on battery .....</li> <li>• Inverter off .....</li> </ul>			

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<ul style="list-style-type: none"> <li>Alarm condition .....</li> </ul>			
Alarm functions tested*			
Alarm indications shall include the following: <ul style="list-style-type: none"> <li>UPS Ok .....</li> <li>Low Battery Voltage .....</li> <li>Auto-Transfer Mode .....</li> <li>Fuse Open .....</li> <li>Battery Discharge Mode .....</li> <li>UPS Output Disabled .....</li> </ul>			
Controls shall include the following: <ul style="list-style-type: none"> <li>Inverter on-off .....</li> <li>UPS start .....</li> <li>Battery test .....</li> <li>Alarm silence/reset .....</li> <li>Output-voltage adjustment .....</li> </ul>			
Remote Lab Status Annunciator Panel Functioning			
<b>Basic Battery Monitoring</b>			
<ul style="list-style-type: none"> <li>Monitoring of the battery string voltage and current .....</li> <li>Charge, discharge, and float current monitoring .....</li> <li>Room ambient and battery string temperature .....</li> <li>Five visual status indicators per string .....</li> <li>Battery cycle counts based on duration .....</li> <li>Long term storage of key battery warranty parameters .....</li> <li>Event log with time and date stamp .....</li> <li>External device alarm input .....</li> <li>Alarm relay contacts output .....</li> <li>Network interface with password and community string protection .....</li> </ul>			

<b>INDUSTRIAL BUS – COMMUNICATION PROTONODE</b>			
Communication of status to remote monitoring equipment tested.*			
The Remote communications device shall provide the following status information of the UPS System at the provided register addresses internal to the communication card.			
Battery Current Bypass Voltage Phase 1 Bypass Voltage Phase 2 Bypass Voltage Phase 3	Battery Voltage Percentage DC Bus Voltage Input Current Phase 1 Input Current Phase 2	Input Voltage Phase 1 Input Voltage Phase 2 Input Voltage Phase 3 Output Current Phase 1	

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Bypass Current Bypass Frequency Battery Rated Holding Time Output Load % Phase 1 Output Load % Phase 2 Output Load % Phase 3	Input Current Phase 3 Input Frequency Output Voltage Phase 1 Output Voltage Phase 2 Output Voltage Phase 3 Shutdown After Delay	Output Current Phase 2 Output Current Phase 3 Output Frequency Output Load % Phase 1					
<p>The communication card shall allow for reading of the following fault / status bits of the UPS systems by the building automation system.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>UPS Input &amp; Output Voltage Sync</li> <li>UPS Output From Inverter</li> <li>UPS Output From Bypass</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> <li>UPS Fault Detected</li> <li>Phase Rotation Error</li> <li>UPS Output From Inverter</li> <li>UPS Output From Bypass</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> <li>UPS Fault Detected</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>Phase Rotation Error</li> <li>DC Bus Undervoltage</li> <li>DC Bus Overvoltage</li> <li>DC Over Current</li> <li>UPS Overheat</li> <li>Battery Overheat</li> <li>Fuse has Opened</li> <li>Inverter Overvoltage</li> <li>Overload</li> <li>Inverter Undervoltage</li> <li>Inverter Overload</li> <li>UPS Overload</li> <li>Inverter Overcurrent</li> <li>UPS Fault Detected</li> </ul> </td> </tr> </table>						<ul style="list-style-type: none"> <li>UPS Input &amp; Output Voltage Sync</li> <li>UPS Output From Inverter</li> <li>UPS Output From Bypass</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> <li>UPS Fault Detected</li> <li>Phase Rotation Error</li> <li>UPS Output From Inverter</li> <li>UPS Output From Bypass</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> <li>UPS Fault Detected</li> <li>Low Battery Voltage Detected</li> <li>Input Voltage Out of Spec</li> </ul>	<ul style="list-style-type: none"> <li>Phase Rotation Error</li> <li>DC Bus Undervoltage</li> <li>DC Bus Overvoltage</li> <li>DC Over Current</li> <li>UPS Overheat</li> <li>Battery Overheat</li> <li>Fuse has Opened</li> <li>Inverter Overvoltage</li> <li>Overload</li> <li>Inverter Undervoltage</li> <li>Inverter Overload</li> <li>UPS Overload</li> <li>Inverter Overcurrent</li> <li>UPS Fault Detected</li> </ul>
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<p>* Reference Field Quality Control Requirement per 263353-3.02</p>							

Number	Date	Remark

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