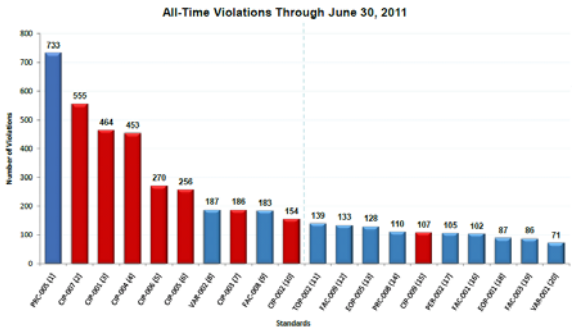
APPLICATION NOTE

NERC Testing with the BITE2

In 2007 FERC approved 83 NERC (North American Electric Reliability Council) Reliability Standards, the first set of legally enforceable standards for the U.S. bulk power system. Compliance with approved NERC Reliability Standards is now mandatory and enforceable in the United States.

This NERC reliability standard PRC-005-6 gives the minimum maintenance requirements for protective relays, DC supplies, DC control circuits, current and voltage sensing devices, stationary battery backup strings and associated telecommunications equipment.



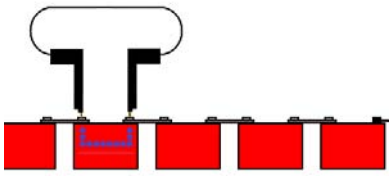
Since this time the number of NERC standards violations has increased. The majority of these are violations of the PRC-005-6 standard.

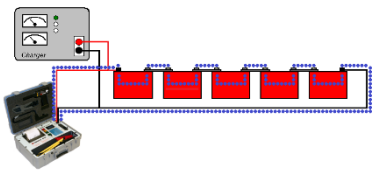
The required NERC tests for battery strings include the following.

1. Station DC Supply Voltage
2. Inspect Electrolyte Levels
3. Check for Un-Intentional Grounds
4. Float Voltage
5. String Continuity
6. Battery Terminal Connection Resistance
7. Battery Inter-cell Resistance
8. Internal ohmic values or capacity testing

The BITE2 supports the following tests.

1. Float Voltage – This is the DC voltage across each battery. The BITE2 measures and records each individual battery float voltage.
   NOTE: This should be done with a low impedance device. A high impedance device like a digital multi-meter puts no load on the cell. A cell with no capacity can still display a good float voltage using a multi-meter.
2. String Continuity – This test verifies current can pass through the entire string. The BITE2 is the only piece of test equipment that directly tests string continuity. The BITE2 injects 10A of current through the entire string. If this current passes through the string then the string passes the NERC required continuity test.





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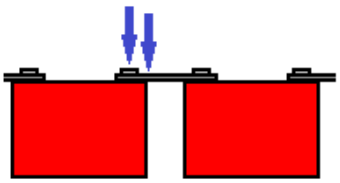
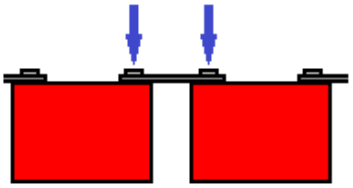
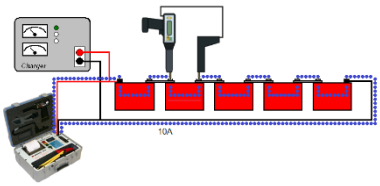
3. Battery Terminal Connection Resistance – This test measures the resistance from the battery terminals to the inter-cell connections. The BITE2 will measure this value when a post to post resistance measurement is taken. This value will be included in the battery inter-cell resistance and will be saved to memory.



4. Battery Inter-cell Resistance – This test measures the inter-cell or strap resistance. The BITE 2 measures the strap resistance using 10A. The 10A current of the BITE2 allows you to measure these low resistances with much better accuracy. In addition since the BITE2 using 4 independent leads (Not kelvin probes) the measured value is an absolute measurement, not a relative measurement.

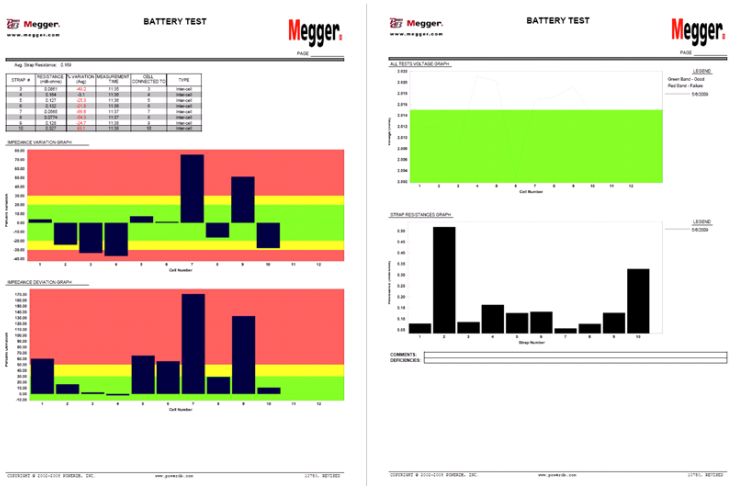


5. Internal ohmic values – The larger a VLA battery is the lower its impedance. If measuring a 100µΩ battery with a mere 100mA of test current the resulting voltage drop being measured is 10µV. If the batteries impedance has increased by 10% due to aging and loss of some active material, (which lowers capacity). The resulting change in voltage that the 100mA tester will try to measure is 1µV. Taking into account possible noise that can be present on the string this change in the battery health will not be seen.



The BITE 2 tests with 10A of current, allowing it to be used even with large VLA batteries. It will see the changes in the batteries state of heath and record them.
There is no use in having a tester that does not have the power to measure changes in the batteries state of health.

All of the BITE2 data can be downloaded directly into the Power DB software.



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Along with inspection the BITE2 is the only piece of test equipment needed to meet the NERC requirements.

NERC Required Testing

Maintenance Activity	BGFT	BITE2	BITE3	Torkel	PowerDB
Unintentional grounds	✓				
String continuity		✓			✓
Float Voltage		✓	✓		✓
Float current			✓		✓
Battery terminal connection resistance		✓	✓		✓
Battery intercell or unit-to-unit connection resistance		✓	✓		✓
Internal ohmic value (Impedance)		✓	✓		✓
Performance or Modified performance test				✓	✓
DC supply performance test when no AC present				✓	✓
Ripple Current		✓	✓		✓
Visual inspections					✓

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