APPLICATION NOTE

Battery Inter-cell Resistance Measurements

When testing inter-cell connections on battery strings it is important to realize this is a relative measurement. When the string is installed all the inter-cell connections should be measured and a baseline value determined from these measurements.

Periodic measurements of these connections should be performed. In general an increase of 20% from the baseline value would indicate an inter-cell connection that needs attention.

Below are the IEEE recommendations from IEEE450-2010.

> *It is good practice to read and record inter-cell and terminal connection resistances as a baseline upon installation as recommended by IEEE Std 484. It is very important that the procedure be consistent so as to detect upward changes that could be caused by corrosion or loose connections. Increased resistance is a cause for concern and may require corrective action.*
>
> *Normal connection resistance varies with the cell size and connection type. The following methods may be used to establish a connection resistance limit, which should initiate corrective action prior to the next inspection:*
>
> *a. The manufacturer may be contacted to provide a recommended action limit.*
>
> *b. Baseline values are established by measuring the connections after initial installation or after cleaning the connections. A 20% increase from a baseline value on inter-cell or cell to terminal plate connections may serve as a criterion for initiation of corrective action prior to the next inspection. Baseline values are specific to each connection and not an average of all connections.*

The BITE2 battery impedance tester will inject a 10AAC current through the inter-cell connections. The receiver then measures the AC voltage drop across the inter-cell connections. If this measurement exceeds the baseline value by 20% then the inter-cell connection should be investigated.

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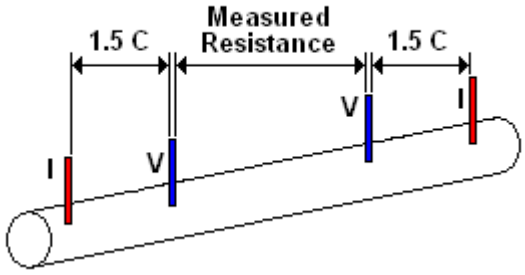
A Digital Low Resistance Ohmmeter (DLRO) will inject a DC current through the inter-cell connections. The DLRO then measures the DC voltage drop across the inter-cell connections. Since the inter-cell connections already has a DC current running through it from the charger and batteries the DLRO measurement has to be taken in both directions. Then the average has to be taken. If this measurement exceeds the baseline value by 20% then the inter-cell connection should be investigated.

Regardless of the instrument used the measurement will be a relative measurement. It compares one measurement to a previous measurement and analyzes how much that measurement has changed.

NOTE: Absolute measurements with a low resistance ohmmeter require a uniform current density through the material under test. In order to ensure a uniform current density through a wire, the potential leads should be separated from the current leads by at least a distance of 1.5 times the circumference of the sample being measured.



To ensure a uniform current density through a bar, the potential leads should be separated from the current leads by at least a distance of 3 times the width of the sample being measured.

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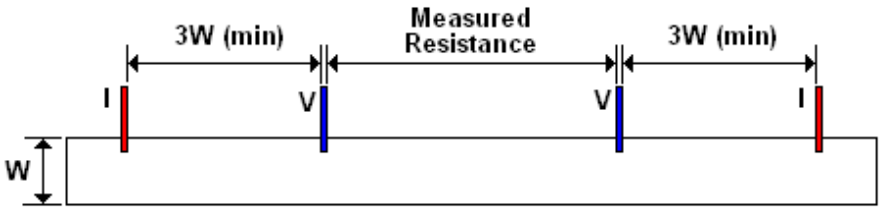

Inter-cell connecting straps on batteries do not have sufficient length past the point of terminal connection to allow for absolute resistivity measurements, relative measurement is required.