

<b>g</b> <i>GE Industrial Systems</i>	<b>Test and Operating Procedure</b>	
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<b>QUALITY REP:</b>		
<b>TITLE:</b> Test Procedure for Multiple Cell Stack Assemblies		<b>PROCEDURE:</b> LOU – GED – CELLSTACK - D

## **1. INTRODUCTORY DESCRIPTION**

- A. This procedure establishes the methods for testing a pressed and non-pressed Cell Stack assembly
- B. Environmental ranges: 70 +/- 10 Deg. F. with 20-75% R.H.
- C. Unit warm-up/stabilization period requirement: None
- D. Personnel using this procedure are expected to have a high degree of confidence and expertise in related testing and calibration procedures.
- E. Procedures not explained here are considered to be understood as common practice.

## **2. TEST EQUIPMENT VERIFICATION**

- A. Verify the accuracy of the standard(s) used in the repair/calibration process by evidence of recent calibration labeling affixed to the test equipment.
- B. All measurement standards used in this procedure shall be traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (N.I.S.T.) and shall have the accuracy, stability, range and resolution required for the intended use.
- C. Unless otherwise specified, the collective uncertainty of the Measurement Standard(s) shall not exceed twenty five percent of the acceptable tolerance for each characteristic being calibrated.
- D. All deviations shall be documented.

## **3. EQUIPMENT CLEANING**

- A. All equipment clean will be performed as instructed in the GE Renewal Services SOP Sec. 14.0

## **4. EQUIPMENT INSPECTION**

- A. The following criteria should be used as a guideline or basis for the inspection process of this unit:
  - 1. Wires broken or cracked.
  - 2. Terminal strips / connectors broken or cracked.
  - 3. Loose wires.
  - 4. Components visually damaged.
  - 5. Capacitors leaking.
  - 6. Solder joint, cold or otherwise inadequate.
  - 7. Circuit board discolored or burned.
  - 8. Printed wire runs burned or damaged.

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## 5. REVISION HISTORY

Revision	Date	Initials	Reason for Revision
A	5/15/02	RKD	Initial Procedure – Copied hand written procedure to this form.
B	06/10/02	RKD	Updated to cover more assemblies
C	06/14/02	RKD	Added additional specs for other non-pressed units, added table 1
D	03/27/06	CW	Updated to cover changes in test.
E			
F			
G			
H			
I			
J			
K			

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## 6. REFERENCE DOCUMENTATION

- Reference: 277A6593, 68A947115

## 7. THEORY OF OPERATION

- Reference: GEK

## 8. TEST EQUIPMENT TO BE USED

- Digital Insulation Tester
- Hydraulic Press and adapters (if needed)
- HCD-1000 Scientific Tester
- 5300HS Scientific Tester

## 9. FINAL TEST AND OPERATION PROCESS

 **Note: Pressed units are assemblies that require more than 4000 lbs of pressure to installed cells.**

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### **Mechanical Inspection (pressed units)**

- Clamp assembly in press and apply pressure so clamp nuts can be easily removed without causing damage to assembly.
- Remove unit from press.
- Dismantle assembly and inspect heat sink surfaces for pitting and scratches.
- Rework or replace damaged mechanical components.
- Prep connection surfaces with Scotch Brite® abrasive pad.
- Apply thin layer of Versilube® grease to surfaces that are in contact with cell.
- Replace all cells with new.
- Refer to assembly drawings to verify cell orientation and wire routing.
- Hand tighten all hardware before re-inserting unit into press.
- Re-insert assembly into press and apply pressure appropriate to cell size.
- Remove assembly from press.

### **Mechanical Inspection (non-pressed units)**

- Dismantle assembly and inspect heat sink surfaces for pitting and scratches.
- Rework or replace damaged mechanical components.
- Prep connection surfaces with Scotch Brite® abrasive pad.
- Apply thin layer of Versilube® grease to surfaces that are in contact with cell.
- Test all cells and replace with new if any fail.
- Refer to assembly drawings to verify cell orientation and wire routing.
- Hand tighten all hardware before applying proper torque.

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- Torque hardware to specifications as outlined in assembly drawing

 **Note: in the absence of torque specifications use the following process and the data outlined in Table 1**

- A. Turn the nuts down finger tight making sure the exposed threads on the studs are equal: plus or minus one thread.
- B. Tighten each nut to 20 inch-pounds: plus or minus 2 inch-pounds to take up all slack in the assembly
- C. Tighten each nut by the turns and fractional turns shown by the closest match to the data in Table 1.

 **Note: Nuts should be tightened alternately a maximum ¼ turn at a time until the desired force setting is reached.**

Clamp Dwg #	Cell Dwg #	Size	# of turns	Bars in Clamp
	68A7200	25mm	3/4	
278A3351P1	68A7210 68A7645	33mm	1	1 – 1 /2
218A4996P1 or P2	68A7210 68A7645	33mm	5/8	1
218A4996P3 or P4	68A7206 68A7207	40mm	7/8	2
218A4996P3 or P4	68A7208 68A7213 68A7214 68A7637 68A7646 68A7647	53mm	1 – 1/4	2

Table 1

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## Electrical / Functional Testing

- Using a Digital Insulation Tester (Megger) measure the resistance from Anode to Cathode of each cell. Value should be over 5 Meg.
- Using a Digital Insulation Tester (Megger) measure the resistance from Cathode to Anode of each cell. Value should be over 5 Meg.

Note: Units with multiple cells should have Megger results comparable from cell to cell.

- Place the assembly in the SCR test station.

### TESTING PROCESS for Cell Test

**SPECIAL NOTE: All SCRs will be tested on the Scientific Tester. If test does not exist it will be created by our specialist. Program shall be open and tested per instructions below.**

#### **1.1 Setup**

##### **1.1.1 Communication between computer and tester**

**1.1.1.1** Double click the ST icon

**1.1.1.2** Click System

**1.1.1.3** Click Communication

**1.1.1.4** Serial port/ click USB

**1.1.1.5** USB port/ select 3

**1.1.1.6** At warning/ press o.k.

**1.1.1.7** Click Accept

##### **1.1.2 To start a new program or pull up an existing one**

**1.1.2.1** Click Test Program

**1.1.2.2** Click Program Generator

##### **1.1.3 If you are starting a new program follow the steps below, if using an existing program proceed to step 1.1.4.**

**1.1.3.1** Refer to the Scientific Test Inc. version 1.18 manual

**1.1.3.2** After completing proceed to step 1.1.5

##### **1.1.4 Using existing program follow steps below.**

**1.1.4.1** Select file name @ Open STI Test Program

**1.1.4.2** Click open

##### **1.1.5 Sending info to tester**

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**1.1.5.1** Click the first button in the lower left corner of the Test Program window or press F5 to send the program to the tester. A successful transmission will display “Receiving Program” on the 5300HS

**1.1.5.2** After the program is received it will display “ready to test” and the device name should appear in the bottom left hand corner of the display

**1.1.5.3** Click runtime on the main window

**1.1.5.4** Click open exact value

**1.1.5.5** Two windows appear

**1.1.5.6** Exit open STI data file

**1.1.5.7** Exit datalog serial number

## **1.2 Testing Procedure**

### **1.2.1 STI Exact Value/Lot Summary**

**1.2.1.1** There are several options available for testing: measurements or pass/fail and single test or complete testing.

**NOTE:** Always perform the leakage test first; this is a good indicator about the condition of the device. The leakage test prevents maximum voltages from being applied to a bad component.

### **1.2.2 Measurement**

**1.2.2.1** Click the M box then click the Send Start Command button (red dot)

**1.2.2.2** Readings appear in the upper left screen

**1.2.2.3** Under Single Test select number 2 and repeat the above instructions. Repeat for each test step.

### **1.2.3 Pass/Fail**

**1.2.3.1** Click the PF box then click the Send Start Command button (red dot)

**1.2.3.2** Readings appear in the upper left screen

**1.2.3.3** Under Single Test select number 2 and repeat the above instructions. Repeat for each test step.

### **1.2.4 Complete Test (in order to perform this task sometimes you have to reboot the SCR tester)**

**1.2.4.1** Open exact value window

**1.2.4.2** Right click on the white screen

**1.2.4.3** Select Datalog Mode

**1.2.4.4** Click All

**1.2.4.4.1** If you have further questions please refer to the OEM manual.

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## 10. SPECIAL INFORMATION



**TEST REWRITTEN BY:** Darren Johnson **DATE:** 3/27/2006

**TEST VERIFIED BY:** James Archibald **DATE:** 3/27/2006