g GE Energy ***Parts & Repair Services*** ***Louisville, KY***	**Functional Testing Specification** **LOU-GED-151X1228BR**

Test Procedure for Wind Rotor Heat Sink Assembly

DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	S. Cash	10/4/2007
B	Added Model number information to the Final Assembly section 6.4.	C. Wade	8/27/2009
C	Clarified step 6.2.2, 6.3.9, and 6.4.1	C. Wade	2/3/2012
D	Added new steps for testing 151X1230 assemblies	S. Cash	5/25/2012

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Scott Cash	J. Hardin		Charlie Wade
DATE	**DATE**	**DATE**	**DATE**
10/4/2007	8/27/2009		10/24/2007

Functional test procedure for Wind Rotor Heat Sink assemblies.

1. SCOPE

1.1 This specification provides the Engineering Requirements for testing a wind turbine rotor heat sink assembly. Comprised of a heat sink, IGBT's and gate cards.

2. STANDARDS OF QUALITY

2.1 Refer to the current revision of the IPC-A-610 standard for workmanship standards.

3. APPLICABLE DOCUMENTS

3.1 The following document(s) shall form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue shall apply.
- **3.1.1** LOU-GED-CELLSTACK
- **3.1.2** Check electronic folder for more information.

4. ENGINEERING REQUIREMENTS

4.1 Equipment Inspection
- **4.1.1** Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:
  - **4.1.1.1** Wires broken or cracked
  - **4.1.1.2** Terminal strips / connectors broken or cracked
  - **4.1.1.3** Loose wires
  - **4.1.1.4** Components visually damaged
  - **4.1.1.5** Capacitors leaking
  - **4.1.1.6** Solder joints damaged or cold
  - **4.1.1.7** Circuit board burned or de-laminated
  - **4.1.1.8** Printed wire runs burned or damaged

5. EQUIPMENT REQUIRED

5.1 The following equipment is required to perform the process requirements. Equipment may be substituted provided that all accuracy's and test ratios are equivalent or better.

Qty	Reference #	Description
1	Wind Rotor Test Stand (H188651)	Functionally tests heat sink assemblies
1		Multimeter Fluke 85 or equivalent
1		Oscilloscope
2	Mounting Jig	Aligns bus bar connections

6. TESTING PROCESS

6.1 Disassembly

6.1.1 Insure caps are installed over coolant ports.

6.1.2 Remove and set aside all reusable lexan covers.

6.1.3 Remove and set aside bus bars and screws.

6.1.4 Carefully unsolder and remove driver card using chip quick if necessary.

6.1.5 Finally remove IGBT's from water block and clean up heat sink compound.

6.2 Test components

6.2.1 Clean and component test the driver cards.

6.2.2 If you are using used IGBT's, it is mandatory that they be tested ahead of time using procedure located on the SCR tester.

6.2.3 Inspect all cables and bus bars for good contacts and clean.

6.2.4 Replace any bad IGBT's or components on the driver card.

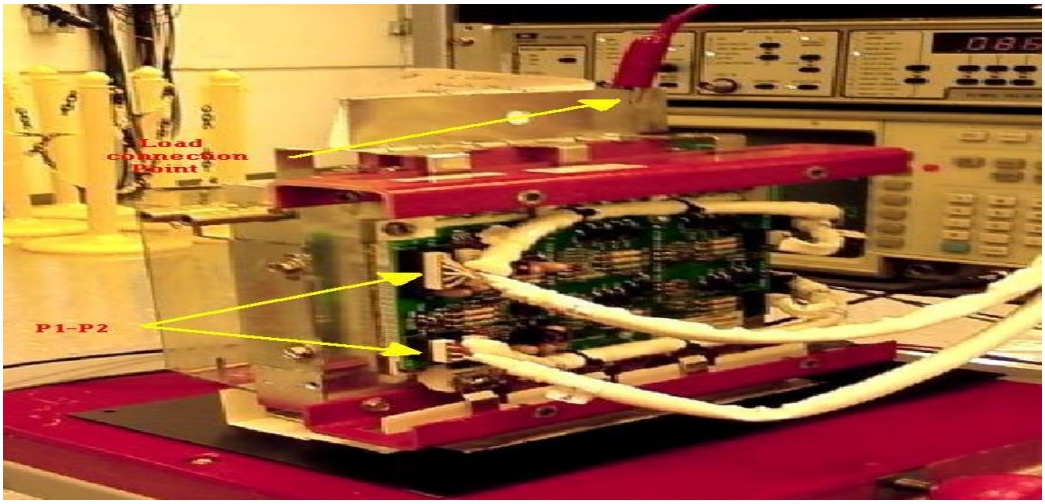
6.3 Setup 151X1228 Assemblies

6.3.1 Reassemble unit less lexan covers. Make sure metric bus bars are used.

6.3.2 Install alignment jig for easy connection to test fixture.

6.3.3 Insert assembly into fixture and tighten connector using red knob. Make sure that coolant ports face away from fixture.

6.3.4 Attach connector from point labeled Load to bus bars atop assembly. Connect P1 and P2 connectors to right side driver card. Go to section 6.5.



6.4 Setup 151X1230 Assemblies

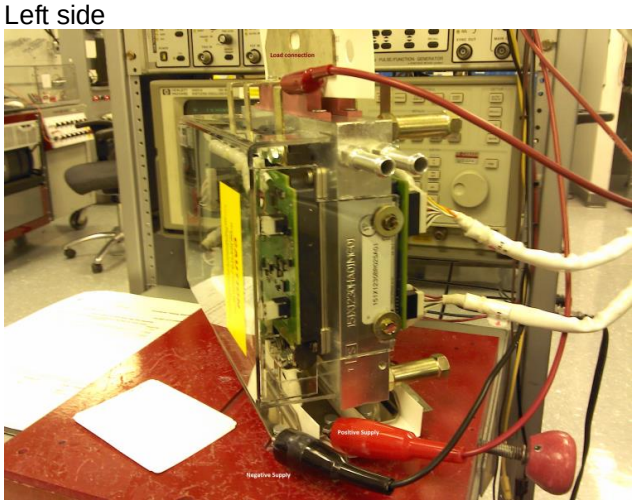
6.4.1 Attach to fixture per the following pictures.

6.4.2 Load on top and supply voltages at the bottom. The inside bus bars are both positive and the outside are negative. All three clips are attached to fixture.

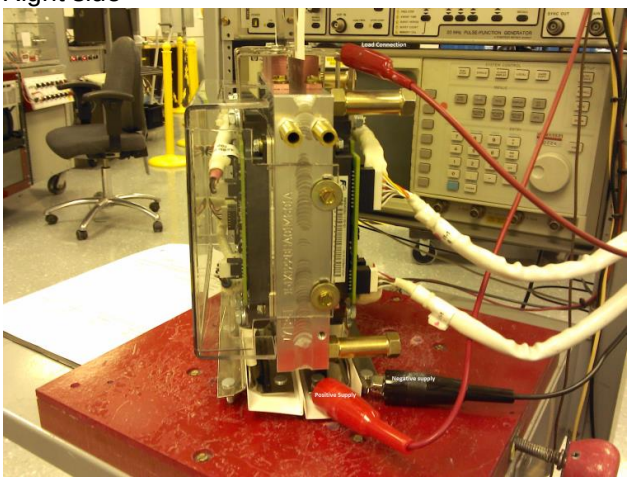
6.4.3 Test both sides by putting an insulator between the top bus-work and moving the wiring to each for testing.

6.4.4 Perform tests as described in main procedure. The only difference is hook up. Go to section 6.5.

Left side



Right side

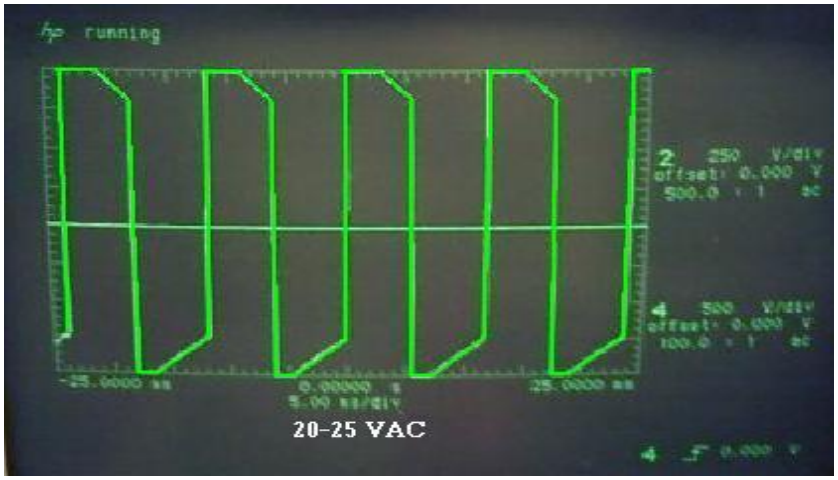


6.5 Function testing 151X1228 and 151X1230 Assemblies

6.5.1 Power up test fixture with test type set to run and High voltage set to off.

6.5.2 Slide an insulator between output bus bars to allow checking of each circuit separately.

6.5.3 Verify correct waveform exists (use calibrated scope) from each circuit on assembly using the following waveform. Verify 20-25VAC from output bus to ground with a calibrated meter. Peak to Peak waveform as seen on scope will be 25-30VAC



6.5.4 Disconnect load from assembly and check Q1-4 for same waveform using scope probe lead.

6.5.5 Verify IGBT temperature sensors are good using the test meter and associated switch. There is a meter (IGBT Temp Sensor) on the test stand and if the meter is in the greenish/blue area it has passed.

6.5.6 Set test type to DSAT to remove voltage from UUT.

6.6 Final Assembly.

6.6.1 Pressure test water block and reseal brass hose connectors if necessary. Pressurize hose to 50lbs. Leave for at least five minutes to verify no leakage.

6.6.2 Install lexan parts.

6.6.3 Make sure a “CAUTION” sticker in applied to lexan cover.

6.6.4 Make sure all insulators, brass spacers, rubber screw caps and rubber coolant port caps are installed.

6.6.5 Make sure unit has two model numbers; one GE Wind model number and one GE model number. One set of the model numbers in (red) should be on the unit before it goes to QA inspection

Wind Model Number	GE Model Number	Description
104W4628R001	151X1228BR01SA01	Single Sided IGBT
104W4629R001	151X1228BR02SA01	Dual Sided IGBT
104W5419R001	151X1230BR01SA01	Single Sided IGBT
104W5420R001	151X1230BR02SA01	Dual Sided IGBT
104W7462R001	151X1230BR01SA02	Single Sided IGBT
104W7463R001	151X1230BR02SA02	Dual Sided IGBT

6.6.6 The unit should also have two serial numbers; one internal serial number used for our tracking and warranty purposes and one for GE Wind tracking purposes. The GE Wind number (GE ID Tag) will be placed on unit at final inspection.

6.7 ***TEST COMPLETE ***

7. REFERENCES

7.1 See section 8 for Part Kit information. All units will go out with the appropriate Parts Kit.

8. Attachments

8.1 Part kits to go along with assemblies

Parts kit for the 104W4628R001		
Part Kit 151X1228BR01PK01		
Part Number	**Quantity**	**Description**
151X1228BR01SA02	1	Line Phase Module
278A2175PUP1	1	Blue Hose
305A6482P5	6	Clamp OE
342A4933CPP1	2	Hose Clamp
218A4335P2	15	Wire Tie
L208P14B13	6	M5 KEPS

Parts kit for the 104W4629R001		
Part Kit 151X1228BR01PK02		
Part Number	**Quantity**	**Description**
151X1228BR02SA02	1	Rotor Phase Module
278A2175PUP1	1	Blue Hose
305A6482P5	6	Clamp OE
342A4933CPP1	2	Hose Clamp
218A4335P2	15	Wire Tie
L208P14B13	12	M5 KEPS

Parts kit for the 104W5419R001 & 107W7462R001		
Part Kit 151X1230BR01PK01		
Part Number	**Quantity**	**Description**
151X1228BR01SA01	1	Line Phase Module
278A2175PUP1	1	Blue Hose
305A6482P5	8	Clamp OE
342A4933CPP1	2	Hose Clamp
218A4335P2	15	Wire Tie
L208P14B13	6	M5 KEPS

Parts kit for the 104W5420R001 & 107W7463R001		
Part Kit 151X1230BR01PK01		
Part Number	**Quantity**	**Description**
151X1228BR02SA01	1	Rotor Phase Module
278A2175PUP1	1	Blue Hose
305A6482P5	8	Clamp OE
342A4933CPP1	2	Hose Clamp
218A4335P2	15	Wire Tie
L208P14B13	12	M5 KEPS