CONFIDENTIAL

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Short title: Siemens Customer Final Report

Witness(s): FPL-Coffey

SIEMENS

FLORIDA POWER & LIGHT

ST LUCIE

Unit Number: 2

Service Event: 2018-08-14 to 2018-09-20
Serial Number: 13A4481-1
Frame Type/Building Blocks: 4448ET3
Job Number: 0NIT18004A23

Generator Modified FIP 358 and Exciter Rotor Swap and FSP 370

Report Written By: Donald Mahoney

District Service Manager: Ray Prevallet

CUSTOMER FINAL REPORT

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1. Event Summary

1.1. Scope Summary

Siemens Energy, Inc., was dispatched to Florida Power and Light, St. Lucie Unit 2 to perform modified generator inspection.

1.2. Unit Information

Generator Serial:	81P830	Generator Frame:	4-126X275
Exciter Serial:	76P126	Exciter Frame:	A201C
HP Serial:	13A4481-1	HP Frame:	4448ET3

1.3. Scope Specific Attachments

1. Introduction

Siemens performed a scheduled refueling outage that included a steam turbine inspection. This work was performed in parallel with a generator FASTGen, crawl-through inspection, tuning weight inspection, exciter rotor swap out and electrical inspection, and rotor radial lead hardware upgrade.

2. Outage Personnel

2.1 Outage Personnel/Customer

Name	Job Description
Dan Deboer	Site Director
David Sluszka	Maintenance Manager
Andy McHenry	Turbine-Generator Project Manager: Day Shift
Julian Norford	Turbine-Generator Project Manager: Night Shift

2.2 Outage Personnel/Siemens

Name	Job Description
Rob Rash	Siemens Project Manager
Robert Schramm	Siemens Night Shift Project Manager
Ken Beck	Siemens Generator Day Shift Mechanical Engineer
Gary Deloach	Siemens Generator Night Shift Mechanical Engineer
Donald Mahoney	Generator Services (GS) Day Shift Engineer
Ricardo Ballinas	GS Night Shift Engineer
Oran Henk	GS Day Shift Lead Winder Technician
Phil Emerick	GS Day Shift Lead Winder Technician
Wes Varion	GS Day Shift Winder Technician
Cliff McCraken	GS Day Shift Winder Technician
Ralpheal Oliver	GS Day Shift Winder Technician
Charles Pribanic	GS Day Shift Winder Technician
Alejandro Garcia	GS Day Shift Winder Technician
Chris Thomas	GS Night Shift Lead Winder Technician
Scott Nichols	GS Night Shift Winder Technician
Ruben Espinoza	GS Night Shift Winder Technician
Jeremy Kimbro	GS Night Shift Winder Technician

3. General

This unit is an outdoor hydrogen, inner-cooled four pole nuclear steam turbine generator. The stator winding has double tube stack cooled coils with a Rigiflex bracing system. The Mark II brushless exciter is air cooled.

The unit has the following nameplate data:

Stator Shop Order Number: **81P830**
Rotor Shop Order Number: **82P620R**
Exciter Shop Order Number: **93P264**
Exciter Rotor (Swapped Rotor): **76P0136**

Ratings given are for 75 psig maximum hydrogen pressure.

MVA 1,200
Stator Voltage 22,000
Stator Amperes 31,492
Power Factor 0.9
Rotor Amperes 7,886
Exciter Voltage 625
Phase 3
Hertz 60
RPM 1,800
Exciter Frame Size A201C
Exciter Rating (KVA) 324.4
PMG Nameplate 1SJBE90643

The stator is wound with Thermalastic insulated coils. This stator was rewound within the scope of the Extended Power Uprate (EPU) and returned to service in May 2011. The unit is operated as a base load machine.

This was the fourth inspection performed by Siemens personnel since 2011.

- February 2017: Generator crawl-through and limited exciter Siemens Field Service Procedure (FSP) 370 testing
- September 2015: Generator crawl-through inspection, tuning weight inspection, Fast Fourier Analysis (FFA) and limited exciter Siemens FSP 370 testing
- March 2014: Crawl-through and limited exciter Siemens FSP 370 testing
- August 2012:
    - Replacement of all stator Resistance Temperature Detectors (RTDs)
    - Generator stator and rotor crawl-through inspection including tuning weight inspection and limited Siemens FSP 370 testing
    - Exciter rotor and stator visual inspection and limited Siemens FSP 370 testing
    - Fiber Optic Vibration Monitor (FOVM) evaluation and Channel 8 and 10 pre-amp card replacement

The generator was partially disassembled for this inspection. The rotor was removed. The coolers and cooler baffles were not removed. The neutral and line connections were opened for testing.

The exciter was completely dismantled for this inspection. The exciter rotor was removed and swapped out with a refurbished rotor from Siemens Charlotte. The exciter air coolers and baffles were removed. The electrical connectors were opened to provide for testing of the exciter components.

4. Tests Performed

4.1 Stator Tests

<u>High Voltage Tests</u>
Dielectric Absorption
Leakage Voltage
DC Maintenance Overpotential

<u>Low Voltage Tests</u>

- Insulation Resistance Each Winding Phase
- RTDs and Thermocouples
- Through Bolts

Resistance Measurements:

- Winding Phases
- RTDs
- Coil Vent Tube to Tube
- Coil Vent Tube to Copper

Mechanical Tests:
Parallel Ring Assembly Air Flow Measurements
Main and Neutral Bushing Air Flow Measurements
Stop Stud Gap Measurements

4.2 Rotor Tests

Pole Balance Measurements and Impedance Calculation
Winding Insulation Resistance Measurements
Winding Resistance Measurement
Radial Lead Pressure Test

4.3 Specialty Tests

FASTGen

4.4 Exciter Tests

Insulation Resistance:
- RTDs and Thermocouples
- Field Winding
- Armature Windings
- PMG Windings
- Diode Wheel to Shaft
- Diode Wheel to Diode Wheel
- Heat Sinks to Diode Wheels
- Bearing Pedestal to Base

Diode Fuse Resistance Measurements
Pole Balance and Impedance Calculation of Field Winding
Resistance Measurements:
- RTDs
- Field Windings
- Field Winding Limit Resistor
- PMG Windings
- Armature Windings
- Diodes – Forward and Reverse

5. Inspection

5.1 Stator

In general, the appearance of the exciter end stator winding was clean and in satisfactory condition.

The exciter end windings, end turn blocking, and banding were inspected and found in satisfactory condition.

Greasing was found underneath the upper cleats for main Leads T1-T4 and T3-T6. See attached pictures. The stator slot wedges were evaluated during the FASTGen inspection. Please refer to the separate Siemens FASTGen inspection report for further wedge tightness evaluation and results. There was no evidence of wedge filler or coil side filler migration. The parallel ring clamping assemblies were tight.

In general, the appearance of the turbine end stator winding was clean and in satisfactory condition.

The turbine end windings, end turn blocking, and banding were inspected and found in satisfactory condition.

The turbine end cone tuning weights were inspected per Siemens Service Bulletin (SB) 2-12-0002-GN-EN-01. Minor greasing was noted. See the attached datasheet at end of the report.

The phase and series connection taping was firm and appeared in satisfactory condition. The gas openings and vent tubes were intact and appeared satisfactory. There was no evidence of corona attack or partial discharge on the end portions of the winding. A very careful examination of the winding was performed for evidence of tape separation. No tape separations were observed.

The stator iron was in satisfactory condition. The laminated end shield appeared in satisfactory condition. There was visual evidence of hot spots on the exciter end and turbine end finger plate heavy sheets. The fingerplate hotspot issue was documented in Siemens PCM 2-18-012840. There was no evidence of blockage of the core's radial or axial ventilation paths. The back of the core was accessible for inspection. There was no evidence of fretting, corrosion, looseness, or cracks in the building bolt and bore ring weldments.

The cooler dome was inspected, and possible lead carbonate was found on the cooler fins. Greasing was noted between the cooler and stator frame connection points. No findings were noted in the lower cooler bay. Noted issues were documented in Siemens PCM 2-18-012975.

The tightness of the through and building bolts were torque and/or tension checked at quadrate locations, and the values were below the minimum acceptable requirements. Siemens PCM 2-18-013111 was submitted to document the "as found" core torque.

The main and neutral lead bushings were clean and in satisfactory condition. There were no signs of porcelain insulator cracking, except for a minor blemish on the T6 Bushing. There were no signs of greasing, gas or oil leakage on the interface of the porcelain to flange seal, inside and outside of the lead box. There was no indication of movement or looseness associated with the bushings or their mounting hardware. There was no sign of voltage leakage.

The air gap baffle ring supporting components were tight. The L seal was in satisfactory condition and comparable to previous inspections. The L seal was noted with minor air gaps between the glass ring and L seal material. Siemens PCM 2-18-012667 documented the as found condition air gap baffle. See the attached photos at the end of the report.

5.2 Rotor

The rotor was inspected to the extent possible and was in satisfactory condition. The winding was generally clean with minor debris on the leading edge of the rotor blocking under the retaining ring.

The end winding bracing blocks were intact and had no evidence of movement. The turn insulation was intact. There was no end turn displacement. There were no damaged and/or loose insulation components.

There was no evidence of heating or burning between the retaining ring fit and rotor body. A FASTGen inspection was completed. See the separate Siemens FASTGen report for further details concerning rotor visual inspection. The lead and stud assemblies were in satisfactory condition. The stud assemblies were found tight. The axial leads were inspected and found tight. The axial lead surfaces and silver plating were satisfactory. The rotor winding pole crossovers were in satisfactory condition.

5.3 Brushless Exciter

The exciter was in satisfactory condition. The exciter rotor was swapped out with a refurbished rotor from the Siemens Charlotte facility. The rotor was in storage prior to installation.

The lead and stud assemblies were in satisfactory condition. The stud assemblies and axial leads were tight. The axial lead surfaces and silver plating were found in satisfactory condition.

The diode wheel assembly was in satisfactory condition. The AC generator and PMG were in satisfactory condition. There were no blown diode fuses. The capacitor and resistor assemblies were in satisfactory condition. The bolting hardware on the diode wheel assembly was found tight. The conductors and riser leads were intact and in satisfactory condition. The glass banding was in satisfactory condition.

The exciter enclosure was inspected and found in satisfactory condition. The 120 volt outlet was found broken. The zone seals were in satisfactory condition except for the inboard zone seal which was found in degraded condition. See the attached picture at the end of the report. The door seals were found with minor weather cracking. The cooler fins appeared to be free of debris.

6. Test Results

6.1 High Voltage

6.1.1 Dielectric Absorption
Dielectric absorption tests were performed on each phase during the initial high potential test. The results of these tests are shown on Curves 1, 2, and 3 in the datasheet section. These curve sheets also show the method of calculation for the conduction component of the total current.

6.1.2 Leakage Voltage
The results of the leakage voltage test are shown in Curve 4 of the datasheet section. This test was applied to each phase following the dielectric absorption test by increasing the voltage in steps according to the time schedule selected through the absorption ratio. This schedule is calculated to maintain a constant proportionality between the test voltage and absorption current. Therefore, any deviations from a straight line curve may be interpreted as pure conduction current, and if these breaks become very sharp, they may be used as an indication of serious trouble or impending failure of the insulation. It is expected that most insulation tested over the range from 15 to 48 KV will have some increases in leakage current due to surface creep and ionization at the higher voltages.

6.1.3 DC Overpotential Tests
The results of the final overpotential 1 minute proof test are shown below. These leakage values are indicative of clean insulation with a relatively high level of dryness and satisfactory for normal risks of service per Siemens specification.

Phase	KVDC	Current Leakage	Insulation Resistance PI
T_1 T_4	48	< 300 microamperes	> 2.0
T_2 T_5	48	< 300 microamperes	> 2.0
T_3 T_6	48	< 300 microamperes	> 2.0

6.2 Low Voltage Tests

6.2.1 Winding Insulation Resistance
A test potential was applied to each stator winding phase for a period of 10 minutes. This was done prior to initial high potential testing. The following satisfactory results were obtained for the initial test.

Insulation Resistance Gigohms

Phase	1 Minute	10 Minutes	P.I.
T_1 T_4	3.76	8.89	2.37
T_2 T_5	4.16	11.2	2.74
T_3 T_6	1.08	2.29	2.12

6.2.2 RTD Insulation Resistance
The insulation resistance of the RTDs was measured and the results of this test were satisfactory as all readings were 32.6 megohms or greater.

6.2.3 Through Bolt Insulation Resistance
The insulation resistance of all stator through bolts was measured before the core tightening process and after completion. The results of the final tests were satisfactory as all readings were 1.71 gigohms or greater.

6.2.4 Building Bolt to Core Support Plate Insulation Resistance
The insulation resistance of each core support plate to ground was checked several times during the core tightening process. The results of the final tests were satisfactory as the results were 1.59 gigohms or greater.

6.2.5 Coil Tube-to-Tube Resistance
The resistance between the adjacent coil vent tube in each coil was measured with a low voltage instrument and recorded. All readings were satisfactory.

6.2.6 Coil Tube-to-Copper Resistance
The resistance between each vent tube to copper conductor of the coils was checked with a low voltage instrument. All tube-to-copper resistance readings were satisfactory.

6.2.7 RTD Resistance Measurements
The DC resistance of each RTD was measured, and the results of these readings are shown in the datasheet section along with calculations showing a comparison between each element. The test results show the RTDs in satisfactory condition.

6.2.8 Winding Resistance
The DC resistance of the stator winding was measured, and the following satisfactory results were obtained:

Phase	Resistance at 29.9 °C	Resistance at 75 °C
T_1 T_4	0.007652 Ω	0.008957 Ω
T_2 T_5	0.007559 Ω	0.008849 Ω
T_3 T_6	0.007630 Ω	0.008931 Ω

These values above compared favorably with previous report test values of 0.008863, 0.008757, and 0.008828 ohms at 75 °C.

6.3 Mechanical Tests

6.3.1 Parallel Ring and Bushing Air Flow Tests
An air flow test was performed to verify that there was no blockage of the ventilation paths in the parallel rings and the bushings. All parallel rings and bushings had satisfactory flow data.

6.3.2 Stop Stud Gap Measurements
The gaps between the short circuit stop studs and the building bolts were measured and recorded. The stop stud gaps were outside of specification. The short stop stud gaps were reset. See the attached datasheet for “as found” and “as left” measurements.

6.4 Rotor Tests

6.4.1 Pole Balance Test and Impedance Calculation
The pole balance test results were satisfactory.

Voltage.....134.0
Amperes 33.0
Impedance.....4.01 Ω

Pole #1 to Crossover..... 33.8 VAC
Pole #2 to Crossover..... 34.6 VAC
Pole #3 to Crossover..... 33.5 VAC
Pole #4 to Crossover..... 32.3 VAC

6.4.2 Insulation Resistance
The insulation resistance of the rotor winding was measured and a satisfactory reading of 20 gigohms was recorded.

6.4.3 Winding Resistance
The DC resistance of the rotor winding was measured and was 0.0703 ohms at 75 °C. This compared satisfactorily with data from previous tests.

6.4.4 Radial Lead Pressure Test
The radial and axial cavity was pressurized with 200 psig of dry nitrogen for 1 hour, and a satisfactory leakage rate of 0 psi/hour resulted.

6.5 Specialty Tests

6.5.1 Siemens Multi-frequency Core Assessment System (SMCAS) Test
Two SMCAS tests were completed during the FASTGen inspection. The initial test was completed as part of the planned FASTGen inspection. The final SMCAS was completed after the core torque. See the separate Siemens FASTGen outage inspection report for the SMCAS test results.

6.6 Exciter Tests

6.6.1 PMG and AC Stator Resistance Measurements
The resistances of the following components were measured, and satisfactory results were obtained:

Component	Measured Resistance at 29.6 °C	Resistance at 75 °C
PMG T10-T20	0.00509	0.00597
PMG T20-T30	0.00508	0.00596
PMG T10-T30	0.00504	0.00591

Component	Measured Resistance at 30.0 °C	Resistance at 75 °C
AC Stator Winding F1-F2	0.061	0.0708

6.6.2 AC Stator Pole Balance and Impedance Measurements
The voltage drop across each pole of the AC exciter field was measured. The results of this test indicated that no shorted turns existed. During the test, a current of 4.3 amperes was also measured and then the impedance was calculated at 29.1 ohms, which was satisfactory.

6.6.3 AC Armature Winding Resistance Measurements
The resistance between each of the 60 riser leads were measured in an assembled condition. Resistance values ranged between 4,561 and 4,612 microohms. These results were satisfactory.

6.6.4 RTD Resistance Measurements
The DC resistance of each RTD was measured using a digital Kelvin Bridge. The results of these readings are shown in the datasheet section along with calculations showing a comparison between each element. The test results found the RTDs in unsatisfactory condition. The RTD wires were found chaffed at the intermediate terminal board. The RTD cables were Siemens cables; however, plant INC Technicians owned the maintenance on the RTD cables. Plant Electricians were requested to repair the chaffed RTD wires. Siemens GS completed their scheduled work scope. The chaffed RTD wires were repaired by Siemens GS during their time on site.

6.6.5 Thermocouple Continuity
The continuity of the Thermocouples (TCs) and the ground detector leads were verified by measuring the cable resistance. All resistance readings were satisfactory.

6.6.6 Insulation Resistance Measurements
The insulation resistances of the following components were measured:

Component	Insulation Resistance
PMG Stator Winding	2,000 megohms
AC Stator Winding F1-F2	23.4 megohms
AC Armature Winding	513 megohms
Bearing Pedestal (Completed by Siemens Mechanical Crew)	4.25 megohms
Inboard Diode Wheel to Shaft *	130 megohms
Outboard Diode Wheel to Shaft *	144 megohms
Inboard Diode Wheel to Outboard Diode Wheel *	69.7 megohms
(Heat Sink or Module) to Inboard Diode Wheel *	24 megohms
(Heat Sink or Module) to Outboard Diode Wheel *	24 megohms

* The test required lifting of diode leads from the fuses.
**RTDs and TCs were tested per Siemens specification. The test results were satisfactory

6.6.7 Exciter Fuse Resistance Measurements
The resistance of each diode fuse was measured and was within the range of 139 to 152 microohms at 25 °C. See the attached datasheets in report.

6.6.8 Diode Resistance Measurements Check
The forward and reverse resistances of the diodes were measured after all of the diode leads were disconnected from the fuses. All the diodes had satisfactory test results. The fuses were reconnected after testing.

7. Maintenance and Repair Program

1. Rotor Radial Lead Hardware Changeout
   1.1. The generator rotor radial lead seal assembly was modified per Siemens Product Bulletin (PB) 3-15-0065-GN-EN-01. The seals were pressure tested after installation.

2. Exciter Rotor Swap
   2.1. Siemens GS completed testing on the new exciter rotor with satisfactory test results.

3. Generator Stator Minor Repairs
   3.1. Siemens GS completed minor repairs to the greasing noted on the turbine end tuning weights. The turbine end tuning weights that were greasing were cleaned with alcohol and wicking resin was applied to reestablish the bond.

   3.2. The greasing noted on the upper main lead cleats was cleaned with alcohol. The roping was removed to torque the upper main lead cleat hardware. The glass hardware was roped after the re-torque was completed.

4. Possible Overheating of Exciter and Turbine End Finger Plate Heavy Sheets
   4.1. Close up photos were taken to document the condition of the exciter end and turbine end finger plate heavy sheet possible hotspots. The finger plates were cleaned with alcohol and painted with red insulating enamel. The turbine end step iron and radial vents were also inspected for possible overheating. Siemens and Core Vis (customer requested borescope specialized vendor) completed the inspection of the exciter end step iron and radial vents due to the air gap baffle installation. Siemens PCM 2-18-012840 recommended a testing the tightness of the vent plate ferrules; however, tightness could not be tested because the rotor was installed and there was no access for testing.

5. Lower and Clean Main/Neutral Bushings for Hi Pot Testing
   5.1. The main and neutral bushing air side covers were removed for access to the bushing isophase rubber boots. The boots were lowered and cleaned for high voltage testing. The bushings were also wiped down with alcohol in preparation for high voltage testing. A minor nick on the T6 Bushing was repaired after the initial high potential testing.

5.2. After high voltage testing was completed, the main and neutral bushing rubber boots were reinstalled.

6. Core Torque As Found Breakaway Torque Low:
   6.1. Siemens GS completed as found break away torque for turbine end and exciter end building bolts and break away tension for the through bolts. The exciter end and turbine end buildings bolts were found at 55.7% and 28% of rated specification, respectively. The average break away tensions for the through bolts were at 72% of rated tension. Siemens Engineering recommended that the building bolts be restored to drawing specification and the through bolts were satisfactory.

   6.2. Siemens Engineering requested a complete set of data for the “as found” turbine end and exciter end building bolt break away torque. All turbine end building bolt breakaway torques were completed. The exciter end building bolt torque “as found” breakaways were partially completed as Siemens Engineering stopped GS after sufficient data was recorded.

   6.3. Siemens Engineering recommended tightening the core by restoring the torque on the exciter end and turbine end building bolts. Per Siemens PCM 2-18-013111, the bore rings in the first and last bay were un-torqued before the core torque. The first and last bay of bore rings were torque to Siemens specification after the core torque was completed.

   6.4. The turbine end and exciter end building bolts nuts were removed in parallel 180^{o} apart. The building bolt nuts and threads were chased. Additional steel washers were added as needed to ensure the that the building bolt nuts would not bottom out during the core torque. The building bolt threads were lubricated per Siemens specification.

   6.5. The turbine end shield vent pipes were backed off to allow for the core to be torqued and allow any possible axial movement. The neoprene rubber sheet between the winding drum and the vent tube at the 9 o’clock position was damaged. After the core torque was completed, the turbine end end shield vent pipes were installed per drawing. The damaged gasket on the end shield vent tube at the 9 o’clock position was replaced with a neoprene gasket cut at site.

   6.6. The core was torqued per Siemens specifications. The customer requested Siemens Engineering evaluate starting at 50% torque. The exciter end and turbine end building bolts were checked at 25% of rated torque in 4 locations, and minimal movement was noted on the building bolt nuts. The core torque started at 50% of rated torque. A final through bolt and building bolt torque breakaway was completed to verify the core torque.

7. Short Circuit Stop Stud Gap Repairs
   7.1. The “as found” short circuit stop stud gap measurements were completed as part of the initial modified Siemens Field Inspection Procedure (FIP) 358 inspection.

   7.2. The short circuit stop stud gap measurements were completed after the core torque. See the attached datasheets for “as found” SCSG measurements and final measurements. Gaps less than 0.020 inch were adjusted. The gaps were repaired with hacksaw blades to reduce any possibility of foreign material issues during the repair process.

8. Damaged Exciter Stator Pole Iron Damage Noted During Final Close Out Inspection
   8.1. Siemens GS noted some pole iron damage of the exciter stationary stator (F1-F2). Minor damage to the banding on the rotor armature was also noted. Siemens PCM 2-18-013446 was submitted to document the issue. Siemens GS applied two layers of resin to the damaged iron on the poles per PCM recommendations. Resin was applied to the damaged armature banding. See the attached pictures of the as found damage and the as left condition.

8. PCM Clarifications/WRITs

PCM Number	Clarifications Description
2-18-012622	**St Lucie Unit 2: Radial Lead Stud Insulation**
2-18-012667	**Air Gap Baffle Rubber Seal Gap**
2-18-012749	**St Lucie Unit 2 As Found Visual Inspection**
2-18-012966	**St Lucie Unit 2 As Found SCSS Gap Measurements**
2-18-012975	**H2 Cooler Dome Crawl-through Inspection Results**
2-18-013040	**Identification of Materials Required to Tighten Core**
2-18-013111	**St Lucie Unit 2 As Found Core Torque Break Away Check**
2-18-012840	**Possible Over Heating on Finger Plates**
2-18-013259	**Parallel Ring Flow Test with Vacuum Test Set**
2-18-013261	**St Lucie Unit 2: Post Core Tightening SMCAS**
2-18-013040	**Identification of Materials Required to Tighten Core**
2-18-013446	**Damaged Exciter AC Stator Pole Laminations**

9. Summary and Recommendations

It is recommended during the next outage of sufficient duration with the rotor removed that the following maintenance be completed:

- Short circuit stop stud radial and axial gaps left out of tolerance should be restored to drawing specification
- Check “as found” tightness for exciter end and turbine end step iron vent ferrules.
- Closely inspect the turbine end and exciter end fingerplate heavy sheets for any sign of possible overheating.
- Complete as found through bolt and building bolt torque break away torque/tension.
- Restore through bolts tension to drawing specification. Complete exciter RTD testing

In the interim, a regular schedule of limited crawl-through inspections should be followed.

1.4. Schedule Milestones

Milestones

Milestone	Comments	Planned Date/Time	Revised Date/Time	Actual Date/Time
Default				
Mobilization *		2018-08-14		2018-08-14
Demobilization *		2018-09-10	2019-02-18	2018-09-20

Work Force

1.5. Related Job Numbers

Main Job Number for this Report

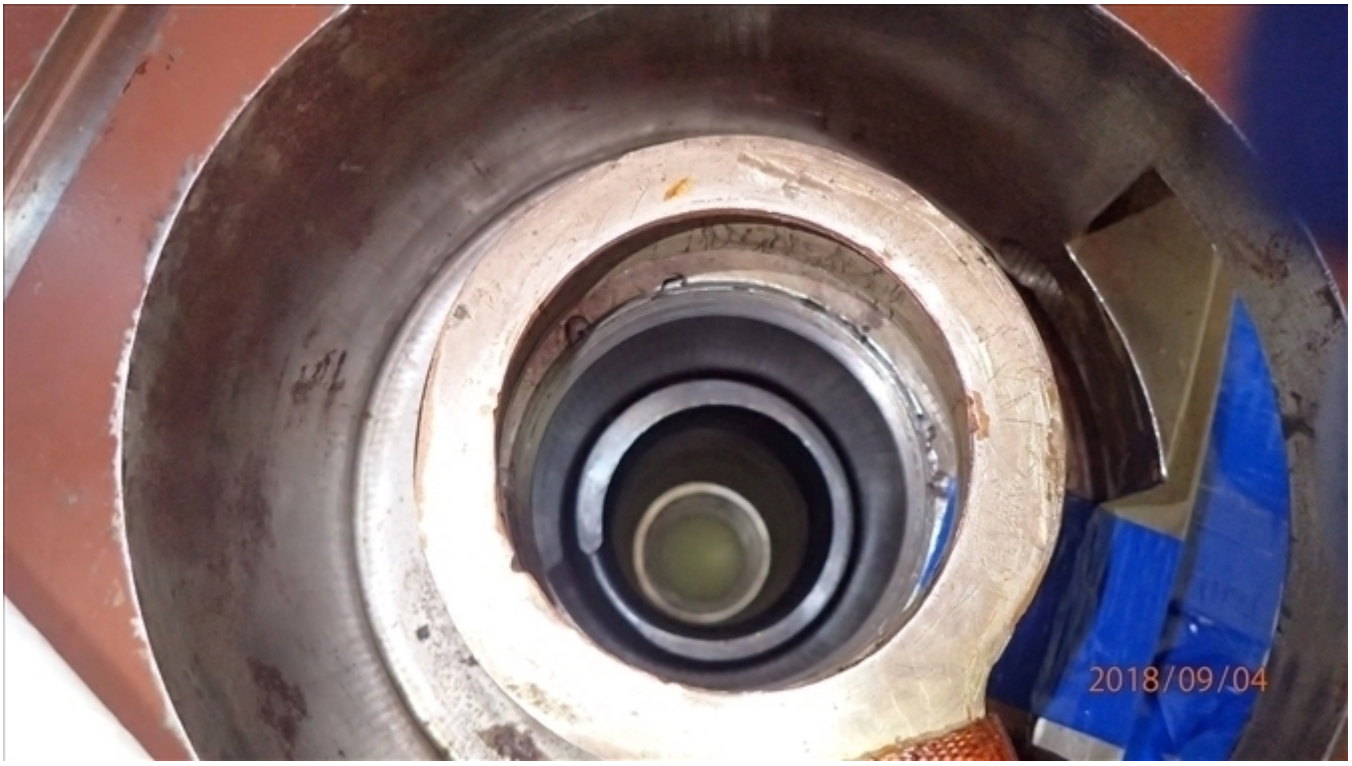
Job Number	Job Description
0NIT18004A23	PSL 2-24 Fall 2018,Gen Crawl-through and Inspection

Additional Job Numbers for this Event

Job Number	Job Description
0NIT18004601	PSL 2-24 #7 & 8 Brg Sizing - EWA
0NIT18004602	PSL 2-24 Gen Repairs, EWA - GS
0NIT18004603	PSL 2-24 Turning Vane Rep, EWA-IPS
0NIT18004604	PSL 2-24 Turning Vane Rep, EWA-NDE
0NIT18004605	PSL 2-24 Core Torque - EWA, GS
0NIT18004606	PSL 2-24 Core Torque Support - EWA, IPS
0NIT18004607	PSL 2-24 Core Torque Support - EWA, FTS
0NIT18004608	PSL 2-24 Post Core Torque SMCAS test, NDE
0NIT18004609	PSL 2-24 TB Ped Cover, EWA - IPS
0NIT18004610	PSL 2-24 Startup Support, EWA - FTS
0NIT18004A41	PSL 2-24 Fall 2018, Gen NDE
0NIT18004A52	PSL 2-24 Fall 2018, LP VLV GEN EXC-IPS
0NIT18004A77	PSL 2-24 Fall 2018, FTS (bump test)
0NIT18004B41	PSL 2-24 Fall 2018, L-0 UTPA
0NIT18004B52	PSL 2-24 Fall 2018, Mob/Plan - IPS
0NIT18004C41	PSL 2-24 Fall 2018, NDE FASTGen

Job Number	Job Description
0NIT18004C52	St. Lucie Planning, Non-Outage Scope, IPS

2. Photos



2.1 As Found Condition of Gen Rotor Radial Lead P1

2.2 Typical Condition of Rotor Windings

2.3 General Condition of the Back of the Core

2.4 Turbine End Tuning Weight Inspection Weight to Cone Moderate Greasing

2.5 Turbine End Tuning Weight Inspection Moderate Greasing

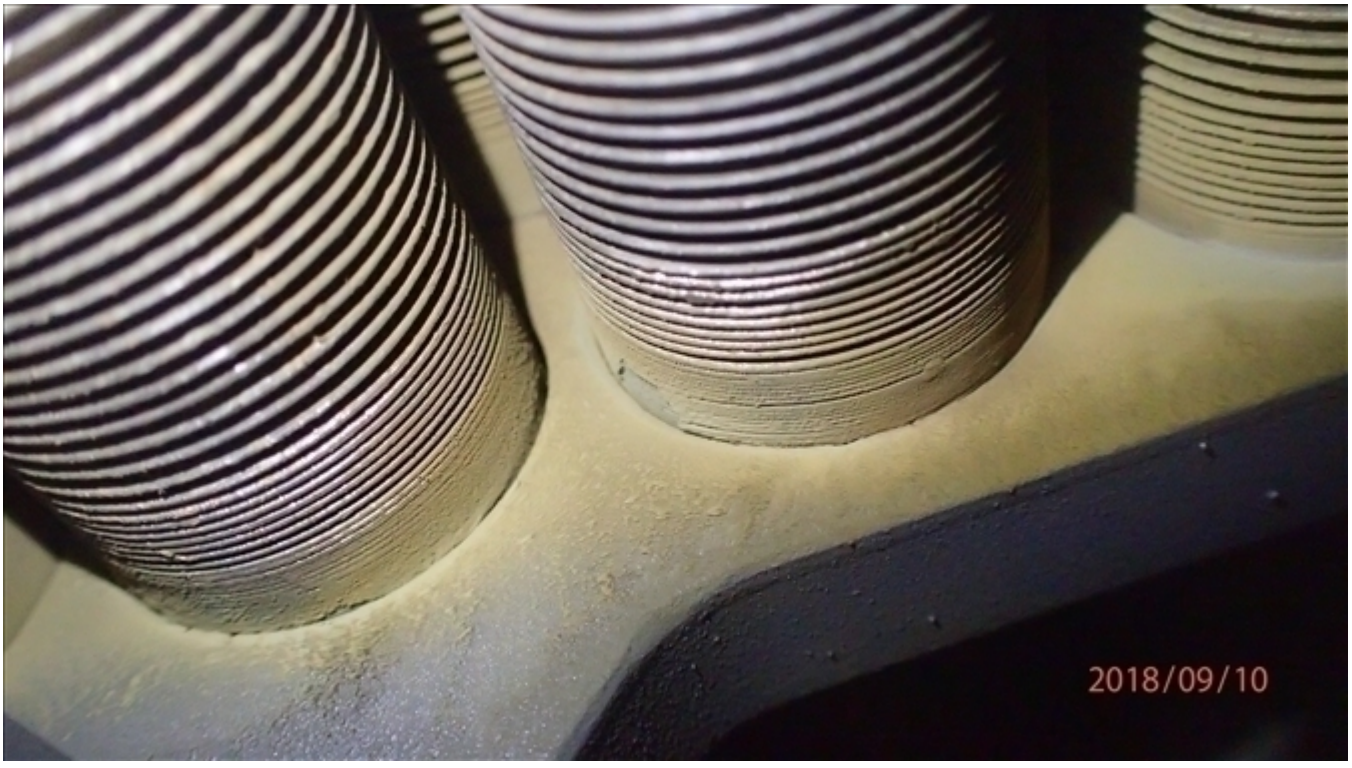
2.6 Turbine End Tuning Weight Inspection Very Light Greasing and Cracking

2.7 Turbine End Tuning Weight Inspection Very Light Greasing

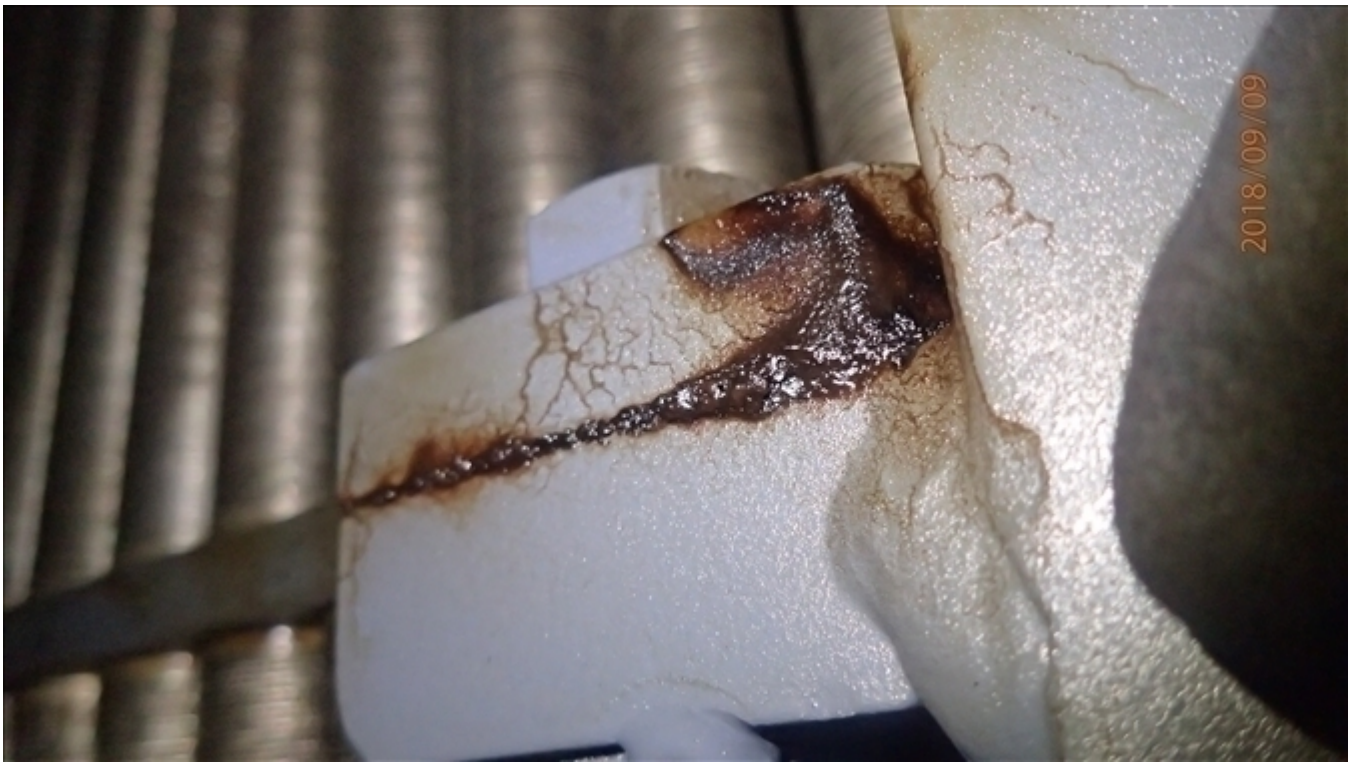
2.8 Worse Case for Greasing / Overheating Noted on Exciter and Turbine End Finger Plate Heavy Sheets

2.9 Typical Condition of Exciter and Turbine End Step Iron and Vents

2.10 Typical Condition of Finger Plates After Painting



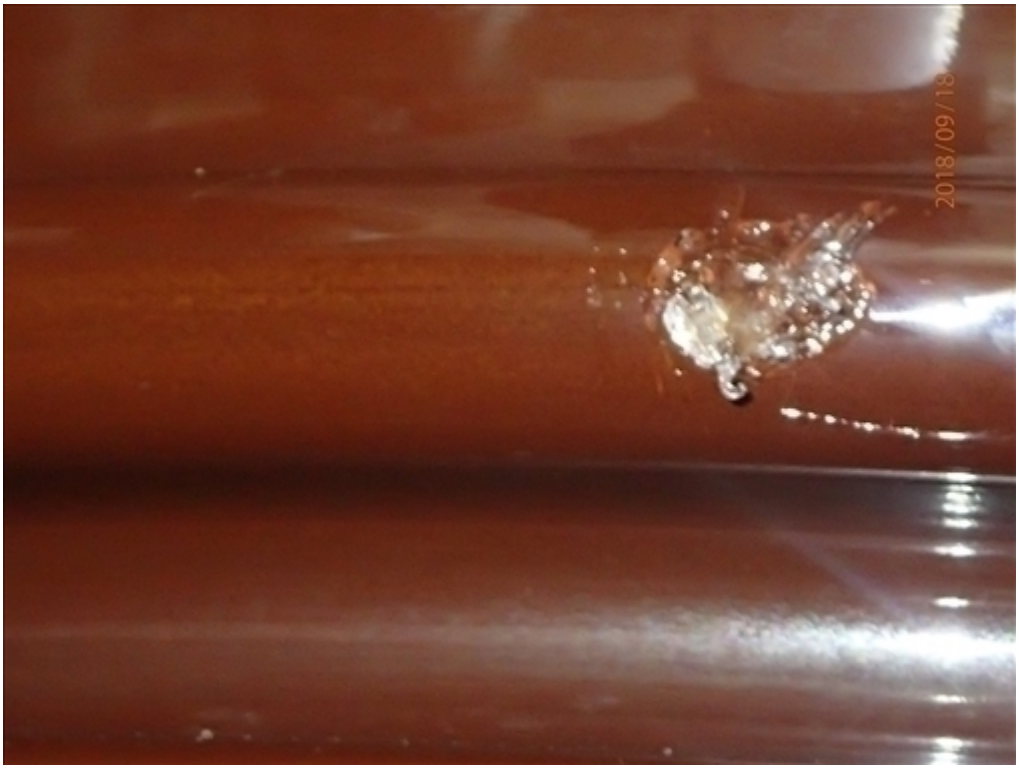
2.11 Possible Lead Carbonate Found in Generator Coolers



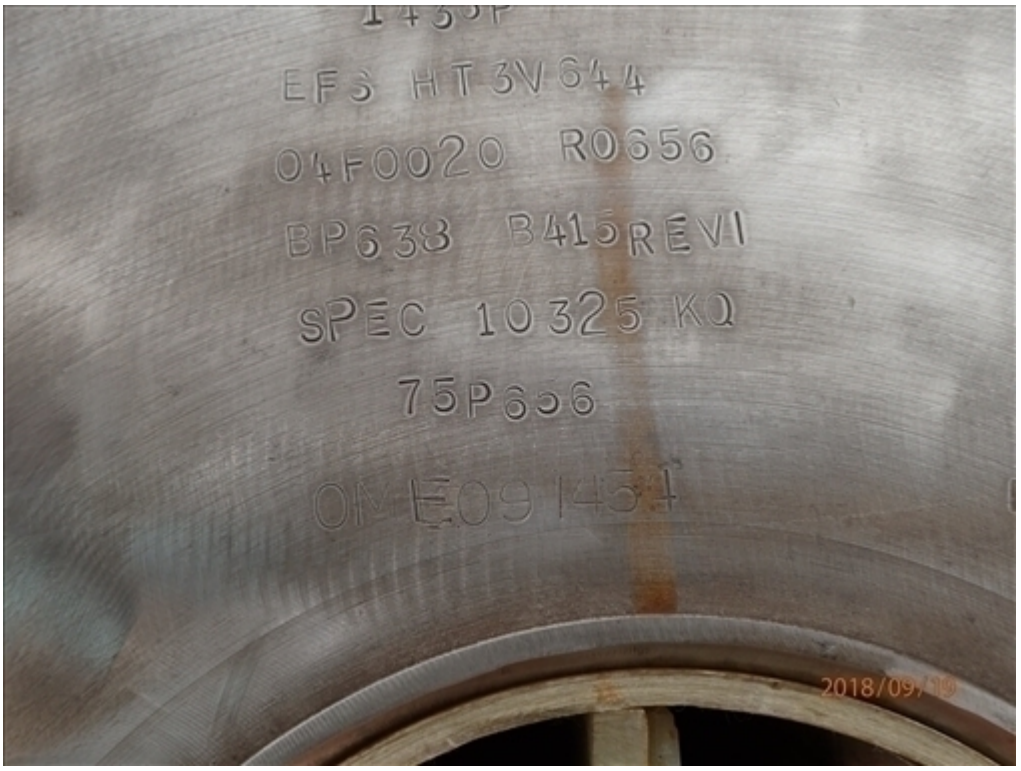
2.12 Grease On Bolts in Upper Cooler Bay Inspection

2.13 Typical Greasing on Exciter end Upper Cleats

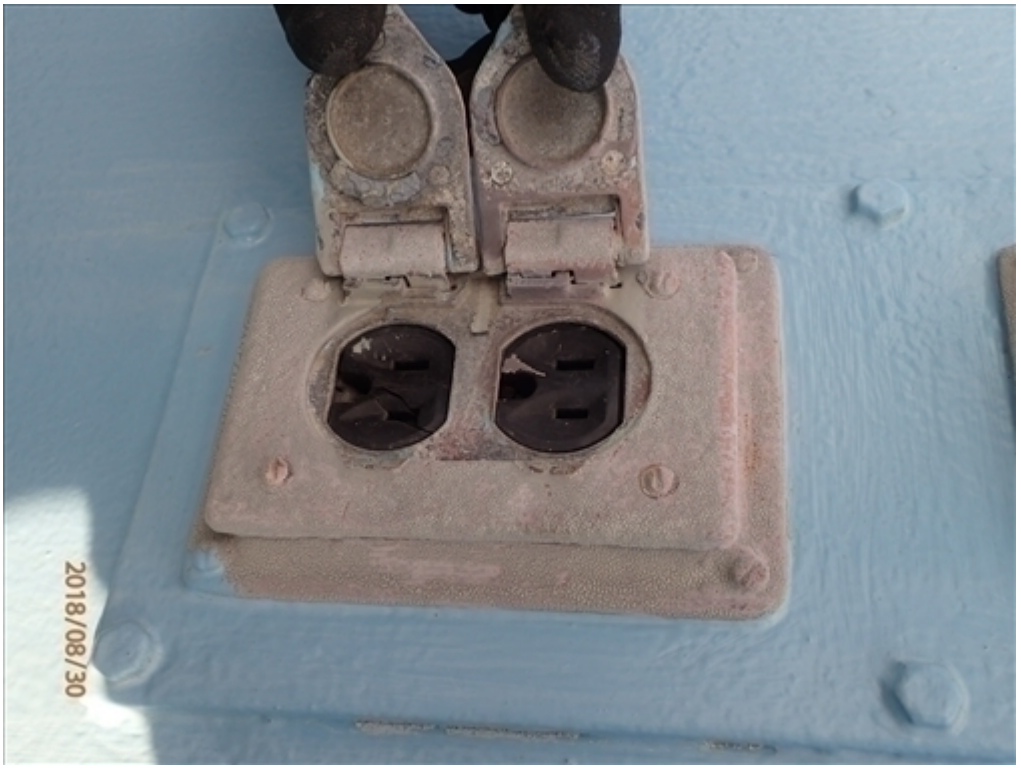
2.14 Turbine End Repaired End Shield Vent Tube Assembly



2.15 Repair to T6 Bushing



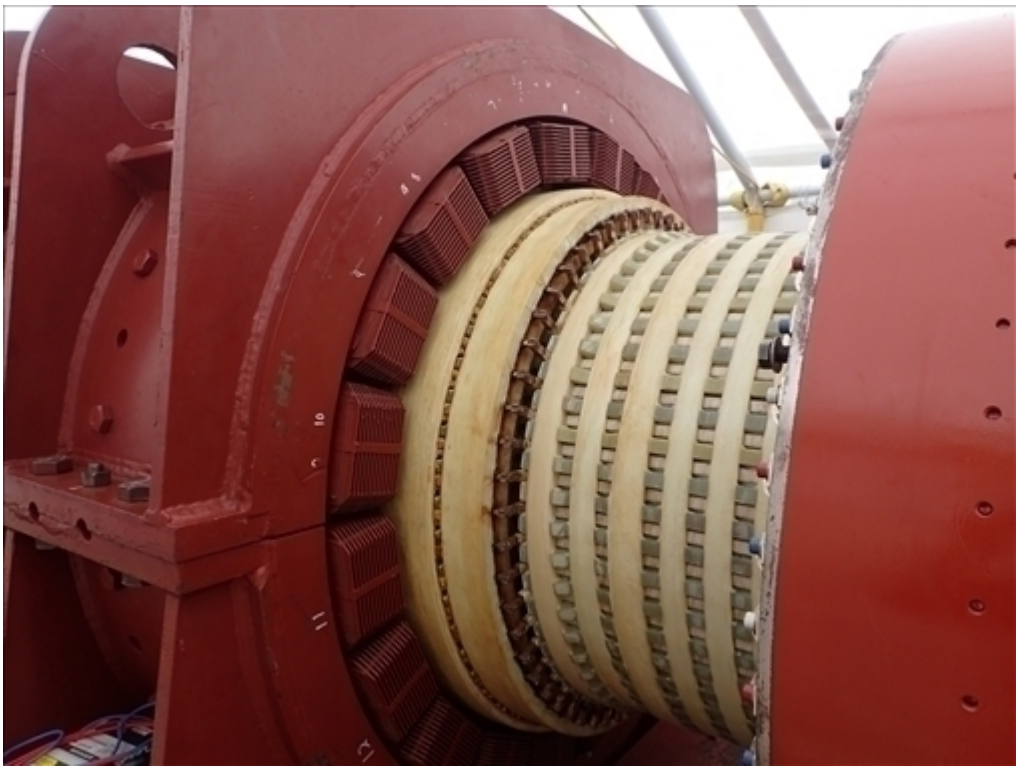
2.16 New Exciter Rotor Shop Order: 75P656



2.17 Exciter Dog House Damaged 120 Volt Outlet

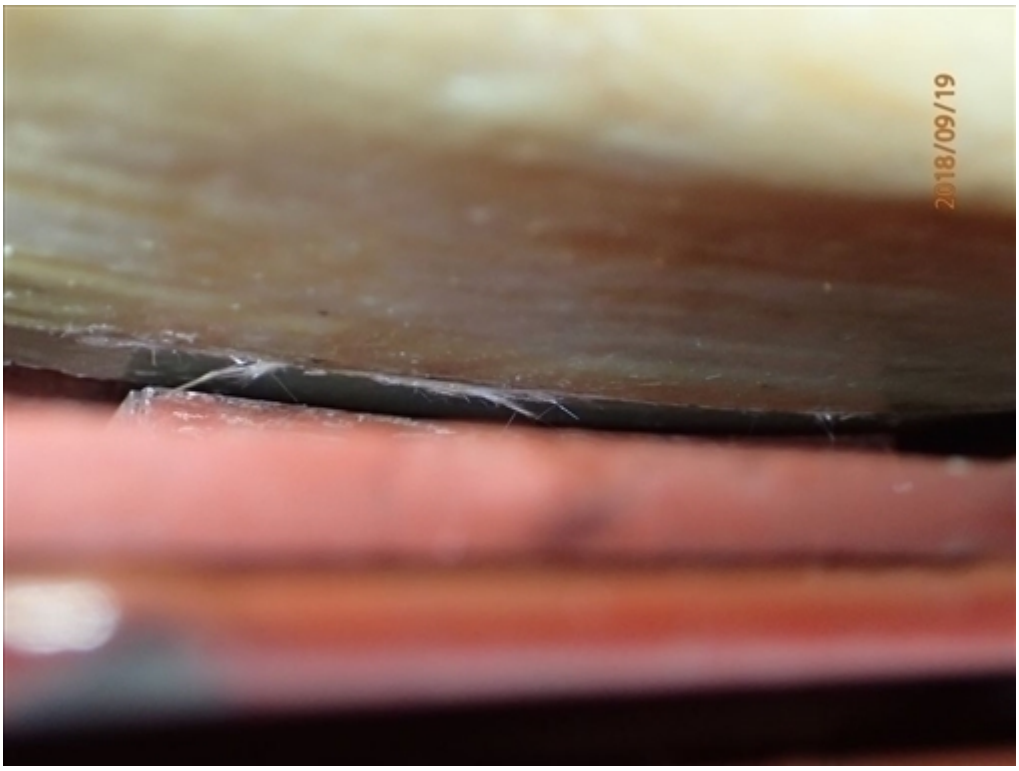
2.18 Exciter RTD Cables Chafed on Intermediate Terminal Board

2.19 Exciter RTD Wires Chafed



2.20 General Condition of New Exciter Rotor Installed

2.21 Weather Cracking on Exciter Dog House Door Gasket material



2.22 Exciter Armature Damaged Banding

2.23 Exciter Stator Pole Iron Damage

2.24 Typical Repair for Damaged Exciter Stator Pole Iron

3. Miscellaneous

PARALLEL RING AND BUSHING FLOW TEST

CUSTOMER: FPL STATION/UNIT: ST LUCIE

S.O. NO.: 81P830 NOZZLE NO: SERIAL NO.: 13592188

TESTER: MAHONEY, BALLANIS CALIBRATION DUE DATE: 9/30/19

DATE: 9/17-18/2018 NOZZLE NO: 78065259, 78065258,78065260

Winding Diagram DSPPG-0113441

Select Configuration →

2 & 4 Pole Parallel Connected Winding			
POSITION	**ΔP (inches of H2O)**	**Flow Data (SCFM)**	
Unrestricted w/nozzle	5.5	119.17	
T1A	22.1	100.79	Top 10 & Block Top 30
T1B	28.5	101.38	Top 30 & Block Top 10
T2B	20.7	95.46	Top 24 & Block Top 3
T2A	32.5	93.55	Top 3 & Block Top 24
T3B	15.9	102.01	Top 17 & Block Top 38
T3A	36.8	95.82	Top 38 & Block Top 17
T4B	15.8	95.1	Top 20 & Block Top 41
T4A	21.4	103.92	Top 41 & Block Top 20
T5B	31.6	92.45	Top 13 & Block Top 34
T5A	19.3	95.48	Top 34 & Block Top 13
T6B	20.9	96.26	Top 27 & Block Top 6
T6A	32.1	95.2	Top 6 & Block Top 27

Mains & Neutrals are on Top Half Coils

Unrestricted w/nozzle	5.1	114.1	
Bottom 19	39.2	92.21	Bottom 19 & Block Bottom 9 (T1-T4)A
Bottom 9	46.5	90.83	Bottom 9 & Block Bottom 19 (T1-T4)A
Bottom 40	52.3	85.45	Bottom 40 & Block Bottom 30 (T1-T4)B
Bottom 30	31.2	92	Bottom 30 & Block Bottom 40 (T1-T4)B
Bottom 33	33.1	90.12	Bottom 33 & Block Bottom 23 (T2-T5)A
Bottom 23	32.7	86.32	Bottom 23 & Block Bottom 33 (T2-T5)A
Bottom 12	37.1	93.25	Bottom 12 & Block Bottom 2 (T2-T5)B
Bottom 2	32.5	90.71	Bottom 2 & Block Bottom 12 (T2-T5)B
Bottom 26	40.3	88.85	Bottom 26 & Block Bottom 37 (T3-T6)A
Bottom 37	20.5	83.4	Bottom 37 & Block Bottom 26 (T3-T6)A
Bottom 5	40.3	93.15	Bottom 5 & Block Bottom 16 (T3-T6)B
Bottom 16	33.8	90.73	Bottom 16 & Block Bottom 5 (T3-T6)B

Cross Connections are on Bottom Half Coils

Unrestricted w/nozzle	1.2	115.7	Retested after test
T1	3.4	110.45	retest 4.3, 103.24
T2	2.6	110.54	Hardest to seal, 2.4, 105.75
T3	2.1	108.19	
T4	3.4	109.44	retest 2.2, 107.22
T5	1.6	106.67	
T6	1.6	108.15	

Bushings

Field Quality Assurance Form 2014-05
Rev. 0

SIEMENS TUNING WEIGHT MASS INSPECTION CHECKLIST

CUSTOMER: FPL STATION/ UNIT NO.: ST. LUCIE 2

JOB NO.: 0NIT18004A23 GENERATOR SERIAL NO. 81P830

ENGINEER: RICARDO BALLINAS DATE: 9/4/2018

Inspection per SB2-12-0002-GN-EN-01 *Orientation for Tuning Weights is viewed from TE A to B in Clockwise Rotation*

MASS NUMBER A/B	NORMAL	GREASING	DUSTING	CRACKING
1A		X, Moderate		
1B		X, Moderate		
2A	X,			
2B	X			
3A		X, Light		X
3B		X, Light		X
4A	X			
4B	X			
5A		X, Light		X
5B		X, Light		X
6A	X			
6B	X			
7A		X, Light		
7B	X			
8A	X			
8B	X			
9A	X			
9B	X			
10A	X			
10B		X, Moderate		
11A		X, Very Light		
11B		X, Light		
12A	X			
12B		X, Light		
13A		X, Moderate		
13B	X			
14A	X			
14B	X			

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES
DOUBLE TUBE STACK

CUSTOMER: FPL STATION/UNIT: ST. LUCIE

TESTER(S): MAHONEY SHOP ORDER: 81P830

TEST INSTRUMENT: FLUKE MTR TEST / INSPECTION DATE: 9/5-6/2018

INSTRUMENT S/N: 13608511 CALIBRATION DUE DATE: 11/20/2018

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots: 42					Total Number of Tubes/Stack: 6				
		Resistance readings in MEGOHMS									
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)									
		1	2	3	4	5	6				
1	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
2	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
3	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
4	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
5	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
6	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
7	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
8	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
9	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
10	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
11	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
12	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
13	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
14	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
15	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
16	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES

DOUBLE TUBE STACK

DATE:_____

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots:	42	Total Number of Tubes/Stack:	6						
		Resistance readings in MEGOHMS									
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)									
		1	2	3	4	5	6				
17	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
18	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
19	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
20	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
21	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
22	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
23	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
24	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
25	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
26	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
27	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
28	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
29	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
30	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
31	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
32	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
33	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
34	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
35	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
36	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES

DOUBLE TUBE STACK

DATE:_____

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots:			42	Total Number of Tubes/Stack:					6
		Resistance readings in MEGOHMS									
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)									
		1	2	3	4	5	6				
37	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
38	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
39	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
40	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
41	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				
42	A	>60	>60	>60	>60	>60	>60				
	B	>60	>60	>60	>60	>60	>60				

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES
DOUBLE TUBE STACK

CUSTOMER: FPL STATION/UNIT: ST. LUCIE

TESTER(S): MAHONEY SHOP ORDER: 81P830

TEST INSTRUMENT: FLUKE MTR TEST / INSPECTION DATE: 9/5-6/2018

INSTRUMENT S/N: 13608511 CALIBRATION DUE DATE: 11/20/2018

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots:	42	Total Number of Tubes/Stack:	8				
		Resistance readings in MEGOHMS							
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)							
		1	2	3	4	5	6	7	8		
1	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
2	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
3	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
4	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
5	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
6	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
7	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
8	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
9	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
10	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
11	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
12	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
13	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
14	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
15	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
16	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES

DOUBLE TUBE STACK

DATE:_____

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots:	42	Total Number of Tubes/Stack:	8				
		Resistance readings in KILOHMS							
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)							
		1	2	3	4	5	6	7	8		
17	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
18	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
19	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
20	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
21	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
22	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
23	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
24	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
25	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
26	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
27	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
28	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
29	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
30	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
31	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
32	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
33	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
34	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
35	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
36	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		

TUBE-TO-COPPER RESISTANCE TEST OF STATOR COIL VENTILATION TUBES

DOUBLE TUBE STACK

DATE:_____

While facing the exciter end winding: A is the counter clockwise side of coil; B is the clockwise side of coil

Top or Bottom Coils		Total Number of Slots:			42		Total Number of Tubes/Stack:				8
		Resistance readings in KILOHMS									
Slot Number		Tubes (Tube #1 is the tube nearest the Bore and numbers progress towards frame)									
		1	2	3	4	5	6	7	8		
37	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
38	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
39	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
40	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
41	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		
42	A	>60	>60	>60	>60	>60	>60	>60	>60		
	B	>60	>60	>60	>60	>60	>60	>60	>60		

TUBE-TO-TUBE RESISTANCE TEST OF STATOR COIL VENTILATION TUBES (DOUBLE TUBE STACK)

CUSTOMER: FPL **STATION/UNIT:** ST LUCIE 2 **S.O. NO.:** 81P380

TEST INSTRUMENT: Multimeter **INSTRUMENT S/N:** Fluke 87 **CALIBRATION DUE DATE:** 11/20/2018

TESTER: Ricardo Ballinas **DATE:** 9/5/2018

A is the counter clockwise side of the coil and B is clockwise side of the coil while facing the exciter end winding.

TOP COILS **TUBE #1 IS TUBE NEAREST BORE AND NUMBERS PROGRESS TOWARDS FRAME** **TOP COILS**

SLOT NO.		TUBES 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
		RESISTANCE -- MEGOHMS								
1	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
2	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
3	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
4	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
5	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
6	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
7	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
8	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
9	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
10	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
11	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
12	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		

SLOT NO.		TUBES 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
		RESISTANCE -- MEGOHMS								
13	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
14	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
15	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
16	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
17	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
18	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
19	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
20	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
21	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
22	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
23	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		
24	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50		

TUBE-TO-TUBE RESISTANCE TEST OF STATOR COIL VENTILATION TUBES (DOUBLE TUBE STACK)

CUSTOMER: FPL **STATION/UNIT:** ST LUCIE 2 **S.O. NO.:** 81P380

TEST INSTRUMENT: Multimeter **INSTRUMENT S/N:** Fluke 87 **CALIBRATION DUE DATE:** 11/20/2018

TESTER: Ricardo Ballinas **DATE:** 9/5/2018

A is the counter clockwise side of the coil and B is clockwise side of the coil while facing the exciter end winding.

TOP COILS		TUBE #1 IS TUBE NEAREST BORE AND NUMBERS PROGRESS TOWARDS FRAME								TOP COILS									
SLOT NO.		TUBES RESISTANCE -- MEGOHMS								SLOT NO.		TUBES RESISTANCE -- MEGOHMS							
		1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10			1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
25	A	>50	>50	>50	>50	>50	>50	>50			37	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
26	A	>50	>50	>50	>50	>50	>50	>50			38	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
27	A	>50	>50	>50	>50	>50	>50	>50			39	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
28	A	>50	>50	>50	>50	>50	>50	>50			40	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
29	A	>50	>50	>50	>50	>50	>50	>50			41	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
30	A	>50	>50	>50	>50	>50	>50	>50			42	A	>50	>50	>50	>50	>50	>50	>50		
	B	>50	>50	>50	>50	>50	>50	>50				B	>50	>50	>50	>50	>50	>50	>50		
31	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													
32	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													
33	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													
34	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													
35	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													
36	A	>50	>50	>50	>50	>50	>50	>50													
	B	>50	>50	>50	>50	>50	>50	>50													

Field Quality Assurance Form 76-11 Rev. 5

TUBE-TO-TUBE RESISTANCE TEST OF STATOR COIL VENTILATION TUBES (DOUBLE TUBE STACK)

CUSTOMER: FPL **STATION/UNIT:** ST LUCIE 2 **S.O. NO.:** 81P380

TEST INSTRUMENT: Multimeter **INSTRUMENT S/N:** Fluke 87 **CALIBRATION DUE DATE:** 11/20/2018

TESTER: Ricardo Ballinas **DATE:** 9/5/2018

A is the counter clockwise side of the coil and B is clockwise side of the coil while facing the exciter end winding.

BOTTOM COILS **TUBE #1 IS TUBE NEAREST BORE AND NUMBERS PROGRESS TOWARDS FRAME** **BOTTOM COILS**

SLOT NO.		TUBES RESISTANCE -- MEGOHMS 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	SLOT NO.		TUBES RESISTANCE -- MEGOHMS 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
1	A	>50	>50	>50	>50	>50					13	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
2	A	>50	>50	>50	>50	>50					14	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
3	A	>50	>50	>50	>50	>50					15	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
4	A	>50	>50	>50	>50	>50					16	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
5	A	>50	>50	>50	>50	>50					17	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
6	A	>50	>50	>50	>50	>50					18	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
7	A	>50	>50	>50	>50	>50					19	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
8	A	>50	>50	>50	>50	>50					20	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
9	A	>50	>50	>50	>50	>50					21	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
10	A	>50	>50	>50	>50	>50					22	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
11	A	>50	>50	>50	>50	>50					23	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
12	A	>50	>50	>50	>50	>50					24	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				

TUBE-TO-TUBE RESISTANCE TEST OF STATOR COIL VENTILATION TUBES (DOUBLE TUBE STACK)

CUSTOMER: FPL **STATION/UNIT:** ST LUCIE 2 **S.O. NO.:** 81P380

TEST INSTRUMENT: Multimeter **INSTRUMENT S/N:** Fluke 87 **CALIBRATION DUE DATE:** 11/20/2018

TESTER: Ricardo Ballinas **DATE:** 9/5/2018

A is the counter clockwise side of the coil and B is clockwise side of the coil while facing the exciter end winding.

BOTTOM COILS **TUBE #1 IS TUBE NEAREST BORE AND NUMBERS PROGRESS TOWARDS FRAME** **BOTTOM COILS**

SLOT NO.		TUBES RESISTANCE -- MEGOHMS 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	SLOT NO.		TUBES RESISTANCE -- MEGOHMS 1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10
25	A	>50	>50	>50	>50	>50					37	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
26	A	>50	>50	>50	>50	>50					38	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
27	A	>50	>50	>50	>50	>50					39	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
28	A	>50	>50	>50	>50	>50					40	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
29	A	>50	>50	>50	>50	>50					41	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
30	A	>50	>50	>50	>50	>50					42	A	>50	>50	>50	>50	>50				
	B	>50	>50	>50	>50	>50						B	>50	>50	>50	>50	>50				
31	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															
32	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															
33	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															
34	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															
35	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															
36	A	>50	>50	>50	>50	>50															
	B	>50	>50	>50	>50	>50															

THROUGH BOLT INSULATION RESISTANCE TEST (FINAL)

CUSTOMER: FPL

STATION: St Lucie UNIT NO.: 2 S.O. NO.: 81P830

TEST VOLTAGE: 1000 VOLTS D.C. TEST INSTRUMENT: Megger

INSTRUMENT S/N: 10524390 CALIBRATION DUE DATE: 27 Aug 2019

ENGINEER: Mahoney DATE: 15 Sept 2019

THROUGH BOLT NO.	READING GIGOHMS	THROUGH BOLT NO.	READING GIGOHMS
1	3.27	25	2.48
2	2.45	26	2.49
3	2.14	27	2.38
4	2.44	28	2.42
5	2.41	29	2.43
6	2.24	30	1.70
7	2.21	31	2.30
8	2.86	32	2.68
9	2.18	33	2.02
10	1.72	34	1.91
11	2.16	35	2.07
12	2.19	36	2.50
13	2.05	37	2.95
14	1.80	38	2.25
15	2.42	39	3.02
16	1.83	40	2.66
17	2.33	41	2.32
18	1.93	42	1.81
19	2.22		
20	2.51		
21	1.57		
22	1.34		
23	2.13		
24	2.26		

NOTE: Bolts are numbered with No. 1 at 12 o'clock position and progressing clockwise facing exciter end winding.

GENERATOR HIGH POTENTIAL TEST DATA

GENERAL INFORMATION:

CUSTOMER: FPL STATION/UNIT: St Lucie 2

STATOR VOLTAGE (NAMEPLATE): 22000 VAC S.O. NO.: 81P830

TEST EQUIPMENT INFORMATION:

TEST INSTRUMENTS: HIPOT Test Set S/N: 10523265 CALIB. DUE DATE: 6/29/2019

Megger S/N: 10524390 CALIB. DUE DATE: 8/27/2019

WINDING INSULATION RESISTANCE AT 5000 VDC AFTER 10 MINUTES:

T1-T4: 8.89 gigohms P.I.: 2.37

T2-T5: 11.2 gigohms P.I.: 2.74

T3-T6: 2.29 gigohms P.I.: 2.12

CONDUCTIVITY OF STATOR COOLING WATER: N/A (FOR A.C. ONLY)

ENVIRONMENT CONDITIONS:

BAROMETRIC PRESSURE: 29.91 in. of Hg AIR TEMPERATURE AT SPHERE GAP: 26.1 ºC

RELATIVE HUMIDITY: 79%

METER VERIFICATION:

TEST VOLTAGE (CALCULATED): 48 kVDC AET VOLTAGE (CORRECTION) FACTOR: 0.981

AET (CORRECTED) VOLTAGE: 48.9 kVDC SPHERE GAP SETTING: 0.643 inches

METER VOLTAGE OF FLASHOVER AT SPHERE GAP: 48000 VDC 1ST

48000 VDC 2ND

48000 VDC 3RD

WINDING TEST DATA:

T1-T4: 300.0 microamps (final leakage current)

T2-T5: 490.0 microamps (final leakage current)

T3-T6: 310.0 microamps (final leakage current)

COMMENTS:

TESTER(S): Ballinas DATE: 9/10/2018

GENERATOR D.C. HIGH POTENTIAL TEST DATA

CUSTOMER: FPL STATION/UNIT: St Lucie 2

STATOR VOLTAGE: 22000 Vac S.O. NO.: 81P830 TESTER(S): Ballinas

DATE: 9/10/2018

DIELECTRIC ABSORPTION DATA			
PHASE	**T1 - T4**	**T2 - T5**	**T3 - T6**
TEST VOLTAGE	15 kV	15 kV	15 kV
Minutes	**microamps**	**microamps**	**microamps**
0.25	100	100	65
0.50	39.00	20.00	35.00
0.75	19.00	7.90	25.00
1.0	12.00	5.10	15.00
1.5	12.00	3.90	15.00
2.0	7.00	3.20	15.00
2.5	4.50	3.00	12.00
3.0	4.00	3.00	10.00
3.5	4.00	2.30	10.00
4.0	3.90	2.20	9.80
5.0	3.20	2.10	9.10
6.0	3.20	2.00	9.00
7.0	3.90	2.00	8.20
8.0	3.10	2.00	8.00
9.0	3.00	2.00	7.90
10.0	3.00	2.00	7.50
PI (I1/I10)	4.00	2.55	2.00
AR	5	5	11

LEAKAGE DATA								
PHASE T1-T4			**PHASE T2 - T5**			**PHASE T3 - T6**		
MAXIMUM TEST VOLTAGE: 48 kV			MAXIMUM TEST VOLTAGE: 48 kV			MAXIMUM TEST VOLTAGE: 48 kV		
ABSORPTION RATIO: 5			ABSORPTION RATIO: 5			ABSORPTION RATIO: 11		
kV	**Time**	**microamps**	**kV**	**Time**	**microamps**	**kV**	**Time**	**microamps**
15	10'-00"	3	15	10'-00"	2	15	10'-00"	7.5
18	13'-44"	8.7	18	13'-44"	3	18	14'-08"	11
21	16'-53"	10	21	16'-53"	7.7	21	17'-42"	12
24	19'-42"	19	24	19'-42"	10	24	20'-54"	19
27	22'-14"	21	27	22'-14"	20	27	23'-51"	35
30	24'-34"	25	30	24'-34"	25	30	26'-34"	40
33	26'-43"	75	33	26'-43"	50	33	29'-07"	52
36	28'-45"	100	36	28'-45"	70	36	31'-31"	68
39	30'-38"	150	39	30'-38"	100	39	33'-47"	85
42	32'-25"	250	42	32'-25"	190	42	35'-56"	100.2
45	34'-07"	290	45	34'-07"	290	45	37'-59"	200
48	35'-43"	300	48	35'-43"	490	48	39'-57"	310

Field Quality Assurance Form 76-2 Rev. 7

STATOR WINDING INSULATION RESISTANCE MEASUREMENTS

CUSTOMER: FPL
S.O. NO.: 81P830
STATION: St Lucie
UNIT: 2
TESTER(S): Ballinas
DATE: 09/10/2018

TEST EQUIPMENT INFORMATION:

TEST INSTRUMENT: AVO Megger
CALIB. DUE DATE: 27 Aug 2019
INSTRUMENT NUMBER: 10524390
TEST VOLTAGE: 5000 Volts D.C.
WINDING TEMPERATURE: 26.1 ºC

INSULATION RESISTANCE (GIGOHMS)			
MINUTES	**T1 - T4**	**T2 - T5**	**T3 - T6**
0.25	1.01	1.12	0.621
0.50	2.26	2.33	0.841
0.75	3.12	3.22	0.916
1.0	3.76	4.16	1.08
1.5	4.37	5.35	1.48
2.0	5.37	6.1	1.61
3.0	6.76	7.32	1.8
4.0	6.9	8.3	1.9
5.0	7.01	8.99	2
6.0	8.36	9.63	2.07
7.0	8.09	10.1	2.11
8.0	8.36	10.6	2.17
9.0	8.7	10.9	2.24
10.0	8.89	11.2	2.29
P.I.	2.37	2.74	2.12

P.I. = The polarization index is the ratio of the insulation resistance (IR) at ten minutes to the IR at one minute.

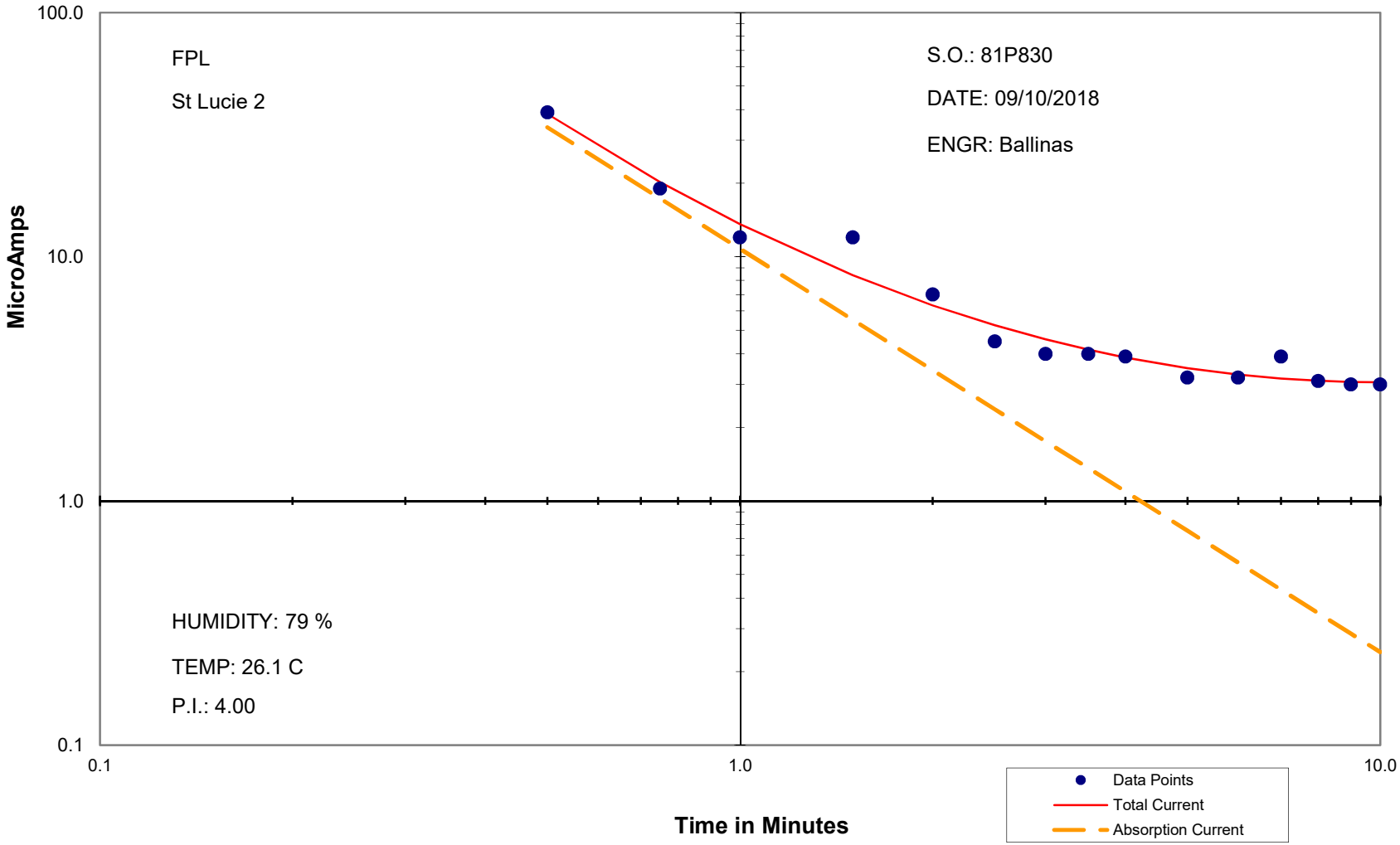
P.I. = IR_{10}/IR_1

Field Quality Assurance Form 89-2
Rev. 8

SIEMENS

DIELECTRIC ABSORPTION CHARACTERISTICS

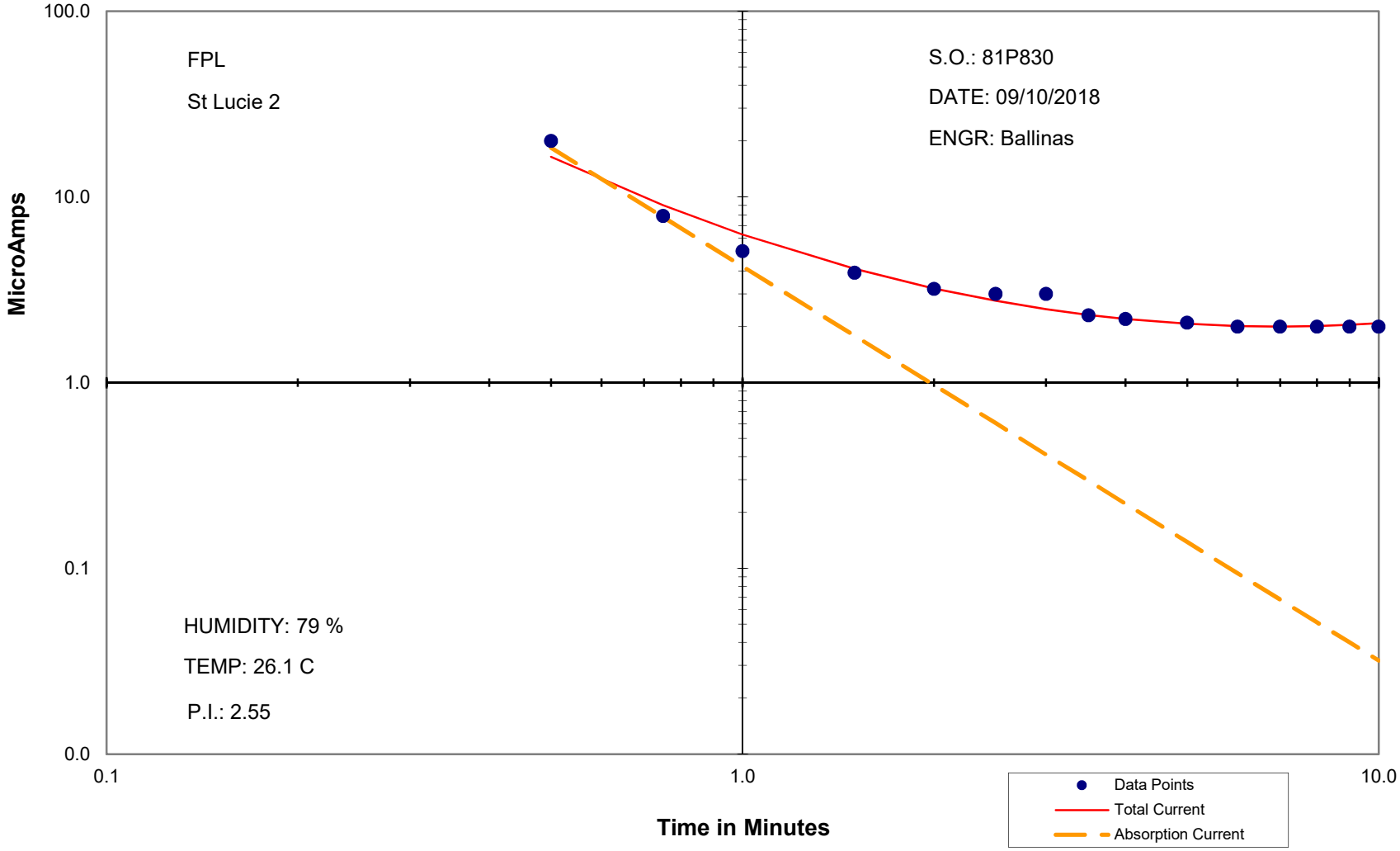
Curve: 1 VOLTS: 15 kV PHASE T1-T4



SIEMENS

DIELECTRIC ABSORPTION CHARACTERISTICS

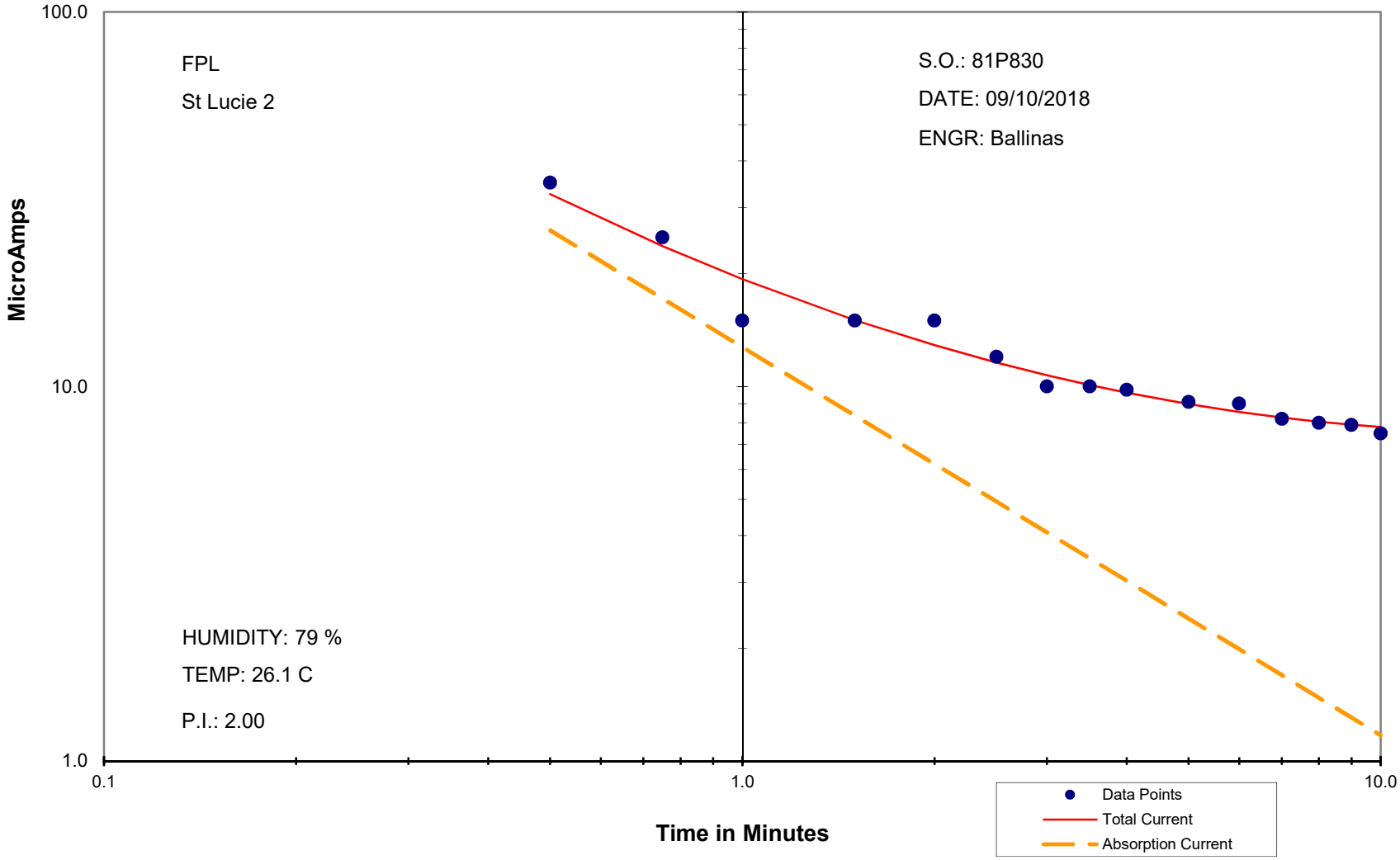
Curve: 2 VOLTS: 15 kV PHASE: T2-T5



SIEMENS

DIELECTRIC ABSORPTION CHARACTERISTICS

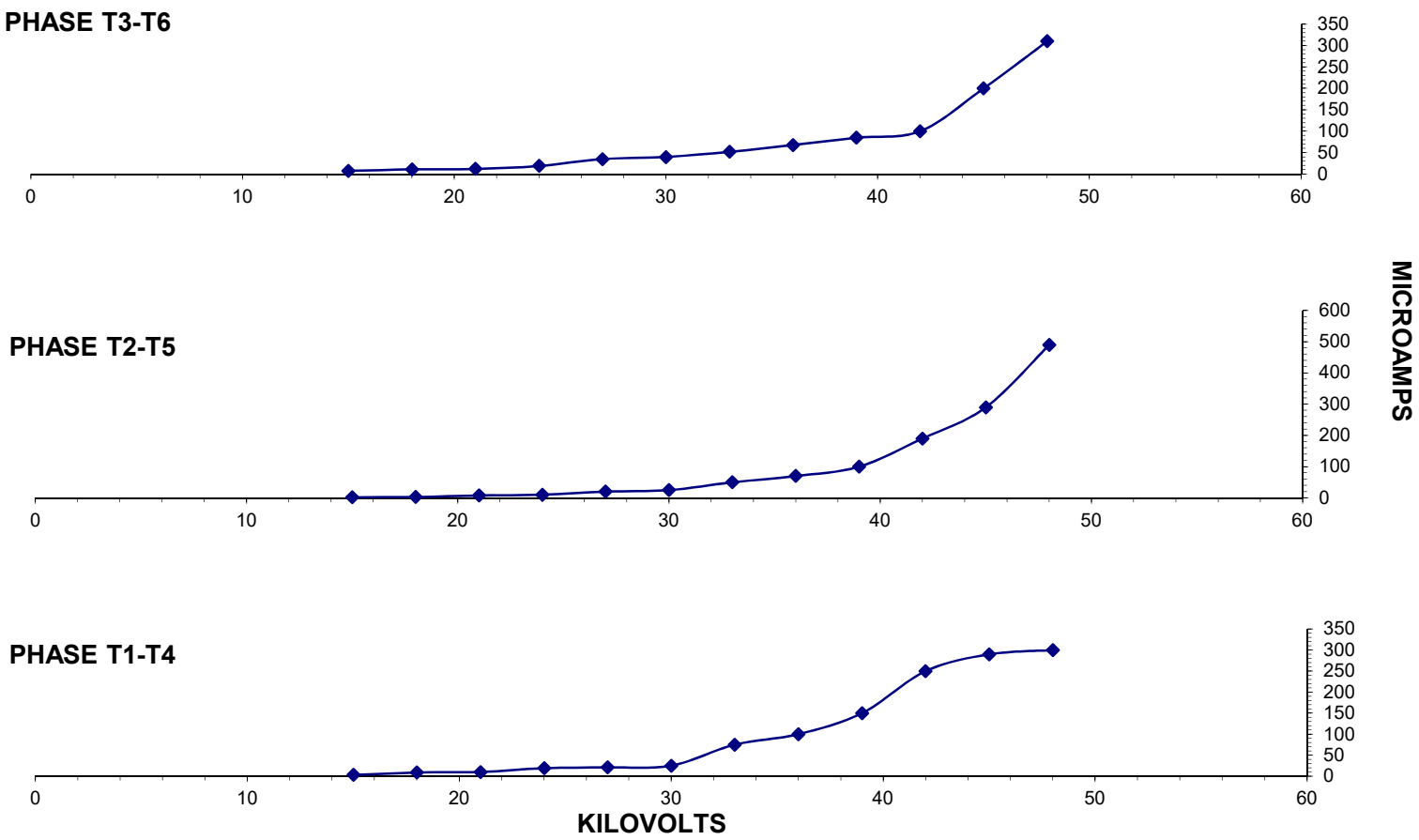
Curve: 3 VOLTS: 15 kV PHASE: T3-T6



SIEMENS

LEAKAGE VOLTAGE

FPL, St Lucie 2



RESISTANCE TEMPERATURE DETECTOR TESTING

CUSTOMER: FPL DETECTOR TYPE: Platnium 100 Ohm IEC-751

STATION/UNIT: ST LUCIE 2 S.O. NO.: 81P830

ENGINEER: MAHONEY DATE: 9/6/2018

TEST INSTRUMENT: KELVIN BRIDGE INSTRUMENT S/N: 10523798

CALIBRATION DUE DATE: 8/14/2018

ELEMENT RESISTANCE $RE = \left[\frac{R_{RY} + R_{RG}}{2}\right] - R_{YG}$

RTD NO.	LOCATION	RESISTANCE (OHMS)				CALCUL-ATED TEMP. °C	MEASURED TEMP. °C	TEMP. DEVIATION
		R-Y	R-G	Y-G	*RE*			
1A	Bottom Coil 34	112.28	112.28	0.27	112.01	31.2	31.3	0.1
1B	Bottom Coil 34	112.39	112.38	0.27	112.12	31.5	31.3	-0.2
2A	Bottom Coil 27	112.54	112.54	0.34	112.20	31.7	32.1	0.4
2B	Bottom Coil 27	112.63	112.65	0.35	112.29	31.9	32.1	0.2
3A	Bottom Coil 20	112.43	112.43	0.28	112.15	31.6	31.6	0.0
3B	Bottom Coil 20	112.39	112.39	0.28	112.11	31.5	31.6	0.1
4A	Bottom Coil 13	112.30	112.30	0.18	112.12	31.5	31.4	-0.1
4B	Bottom Coil 13	112.29	112.30	0.17	112.13	31.5	31.4	-0.1
5A	Bottom Coil 6	112.10	112.18	0.13	112.01	31.2	31.3	0.1
5B	Bottom Coil 6	112.12	112.12	0.13	111.99	31.1	31.3	0.2
6A	Bottom Coil 41	112.29	112.31	0.19	112.11	31.5	31.4	-0.1
6B	Bottom Coil 41	112.23	112.23	0.18	112.05	31.3	31.4	0.1
7A	Bottom Coil 31	112.41	112.41	0.30	112.11	31.5	31.3	-0.2
7B	Bottom Coil 31	112.40	112.39	0.30	112.10	31.4	31.3	-0.1
8A	Bottom Coil 24	112.51	112.52	0.30	112.22	31.7	31.6	-0.1
8B	Bottom Coil 24	112.32	112.23	0.19	112.09	31.4	31.6	0.2
9A	Bottom Coil 17	112.38	112.38	0.22	112.16	31.6	31.5	-0.1
9B	Bottom Coil 17	112.40	112.40	0.23	112.17	31.6	31.5	-0.1
201A	Bottom Coil 34	112.33	112.33	0.27	112.06	31.3	31.3	0.0
201B	Bottom Coil 34	112.35	112.36	0.27	112.09	31.4	31.3	-0.1
202A	Bottom Coil 27	112.58	112.60	0.35	112.24	31.8	32.1	0.3
202B	Bottom Coil 27	112.60	112.60	0.35	112.25	31.8	32.1	0.3
203A	Bottom Coil 20	112.53	112.53	0.29	112.24	31.8	31.6	-0.2
203B	Bottom Coil 20	112.48	112.48	0.28	112.20	31.7	31.9	0.2
204A	Bottom Coil 13	112.36	112.36	0.18	112.18	31.6	31.4	-0.2
204B	Bottom Coil 13	112.31	112.40	0.18	112.18	31.6	31.4	-0.2
205A	Bottom Coil 6	112.22	112.22	0.13	112.09	31.4	31.3	-0.1
205B	Bottom Coil 6	112.19	112.19	0.13	112.06	31.3	31.3	0.0

Field Quality Assurance Form 76-7
Rev. 10
Platinum - IEC-751

RESISTANCE TEMPERATURE DETECTOR TESTING

CUSTOMER: FPL DETECTOR TYPE: Platnium 100 Ohm IEC-751

STATION/UNIT: ST LUCIE 2 S.O. NO.: 81P830

ENGINEER: MAHONEY DATE: 9/6/2018

TEST INSTRUMENT: KELVIN BRIDGE INSTRUMENT S/N: 10523798

CALIBRATION DUE DATE: 8/14/2018

ELEMENT RESISTANCE $RE = \left[\frac{R_{RY} + R_{RG}}{2}\right] - R_{YG}$

RTD NO.	LOCATION	RESISTANCE (OHMS)				CALCUL-ATED TEMP. °C	MEASURED TEMP. °C	TEMP. DEVIATION
		R-Y	R-G	Y-G	*RE*			
206A	Bottom Coil 6	112.51	112.51	0.32	112.19	31.7	31.4	-0.3
206B	Bottom Coil 6	112.22	112.21	0.19	112.03	31.2	31.4	0.2
207A	Bottom Coil 31	112.47	112.48	0.30	112.18	31.6	31.3	-0.3
207B	Bottom Coil 31	112.39	112.39	0.31	112.08	31.4	31.3	-0.1
208A	Bottom Coil 24	112.56	112.57	0.32	112.25	31.8	31.6	-0.2
208B	Bottom Coil 24	112.58	112.57	0.31	112.27	31.9	31.6	-0.3
209A	Bottom Coil 17	112.40	112.48	0.21	112.23	31.8	31.5	-0.3
209B	Bottom Coil 17	112.34	112.35	0.21	112.14	31.5	31.5	0.0
210A	Bottom Coil 10	112.33	112.33	0.13	112.20	31.7	31.5	-0.2
210B	Bottom Coil 10	112.30	112.30	0.13	112.17	31.6	31.5	-0.1
211A	Bottom Coil 3	112.14	112.23	0.13	112.06	31.3	31.3	0.0
211B	Bottom Coil 3	112.17	112.17	0.13	112.04	31.3	31.3	0.0
212A	Bottom Coil 38	112.25	112.25	0.21	112.04	31.3	31.5	0.2
212B	Bottom Coil 38	112.27	112.27	0.21	112.06	31.3	31.5	0.2
21A	Cold Gas EE	114.75	114.75	0.67	114.08	36.6	35.8	-0.8
21B	Cold Gas EE	114.76	114.76	0.68	114.08	36.6	35.8	-0.8
22A	Cold Gas TE	113.41	113.40	0.35	113.06	33.9	33.8	-0.1
22B	Cold Gas TE	113.49	113.49	0.35	113.14	34.1	33.8	-0.3
23	Warm Gas EE	112.50	112.51	0.30	112.21	31.7	32.1	0.4
24	Warm Gas TE	112.23	112.22	0.26	111.97	31.1	32.0	0.9
25A	Cold Gas EE	113.89	113.89	0.67	113.22	34.3	34.4	0.1
25B	Cold Gas EE	113.93	113.93	0.68	113.25	34.4	34.4	0.0
26A	Cold Gas TE	112.71	112.70	0.39	112.32	32.0	32.0	0.0
26B	Cold Gas TE	113.07	113.01	0.38	112.66	32.9	32.0	-0.9
32.6 megohm @ 1 min (All RTD's tied together								
217A	Bottom Coil 3	112.21	112.21	0.13	112.08	31.4	31.3	-0.1
217B	Bottom Coil 3	112.19	112.19	0.12	112.07	31.4	31.3	-0.1

Field Quality Assurance Form 76-7
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Platinum - IEC-751

RESISTANCE TEMPERATURE DETECTOR TESTING

CUSTOMER: FPL DETECTOR TYPE: Platnium 100 Ohm IEC-751

STATION/UNIT: ST LUCIE 2 S.O. NO.: 81P830

ENGINEER: MAHONEY DATE: 9/6/2018

TEST INSTRUMENT: KELVIN BRIDGE INSTRUMENT S/N: 10523798

CALIBRATION DUE DATE: 8/14/2018

ELEMENT RESISTANCE $RE = \left[\frac{R_{RY} + R_{RG}}{2}\right] - R_{YG}$

RTD NO.	LOCATION	RESISTANCE (OHMS)				CALCUL-ATED TEMP. °C	MEASURED TEMP. °C	TEMP. DEVIATION
		R-Y	R-G	Y-G	*RE*			
216A	Bottom Coil 6	112.38	112.39	0.13	112.26	31.8	31.5	-0.3
216B	Bottom Coil 6	112.18	112.18	0.13	112.05	31.3	31.5	0.2
12A	Bottom Coil 38	112.30	112.29	0.23	112.07	31.3	31.5	0.2
12B	Bottom Coil 38	112.24	112.24	0.23	112.01	31.2	31.5	0.3

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BUILDING BOLT TO CORE SUPPORT PLATE INSULATION RESISTANCE

CUSTOMER: FPL

STATION: St Lucie UNIT NO.: 2 S.O. NO.: 81P830

TEST VOLTAGE: 250 VOLTS D.C. TEST INSTRUMENT: Megger

INSTRUMENT S/N: 10524390 CALIBRATION DUE DATE: 27 Aug 2019

ENGINEER: Ballinas DATE: Sept 15th, 2018

EXCITER END SUPPORT PLATE	READING GIGOHMS	TURBINE END SUPPORT PLATE	READING GIGOHMS
1	10.3	1	19.6
2	9.47	2	13.8
3	5.73	3	8.41
4	5.82	4	8.41
5	4.36	5	3.48
6	4.85	6	13.1
7	5.03	7	12.4
8	1.63	8	19.2
9	8.27	9	24.4
10	4.93	10	14.3
11	4.68	11	9.47
12	6.55	12	1.59
13	6.47	13	5.63
14	13.6	14	9.73
15	7.47	15	11.2
16	4.19	16	17.6
17	2.49	17	8.39
18	12.1	18	15.4
19	20.7	19	23.6
20	14.0	20	8.02
21	6.61	21	25.6

NOTE: Core support plates are numbered with No. 1 at 12 o'clock position and progressing clockwise.

CORE SUPPORT PLATE TO CORE SUPPORT PLATE INSULATION RESISTANCE

CUSTOMER: FPL

STATION: St Lucie UNIT NO.: 2 S.O. NO.: 81P830

TEST VOLTAGE: 250 VOLTS D.C. TEST INSTRUMENT: Megger

INSTRUMENT S/N: 10524390 CALIBRATION DUE DATE: 27 Aug 2019

ENGINEER: Ballinas DATE: Sept 15th, 2018

EXCITER END SUPPORT PLATES	READING GIGOHMS	TURBINE END SUPPORT PLATES	READING GIGOHMS
1 – 2	18.8	1 – 2	19.9
2 – 3	14.3	2 – 3	18.4
3 – 4	16.0	3 – 4	10.5
4 – 5	16.1	4 – 5	2.15
5 – 6	9.89	5 – 6	19.7
6 – 7	18.5	6 – 7	18.6
7 – 8	14.6	7 – 8	15.6
8 – 9	14.7	8 – 9	24.7
9 – 10	14.8	9 – 10	23.9
10 – 11	22.1	10 – 11	20.6
11 – 12	19.5	11 – 12	25.5
12 – 13	12.4	12 – 13	32.1
13 – 14	15.5	13 – 14	6.68
14 – 15	9.87	14 – 15	1.29
15 – 16	7.22	15 – 16	17.0
16 – 17	11.0	16 – 17	42.6
17 – 18	13.5	17 – 18	15.0
18 – 19	19.1	18 – 19	16.7
19 - 20	14.9	19 - 20	34.6
20 - 21	17.1	20 - 21	15.5
21 - 1	9.92	21 - 1	13.0

NOTE: Core support plates are numbered with No. 1 at 12 o'clock position and progressing clockwise.

FLEX PLATE OR STOP STUD TO CORE SUPPORT PLATE GAP MEASUREMENTS AS FOUND

CUSTOMER: FPL

STATION/UNIT: ST. LUCIE 2 S.O. NO.: 81P830

TESTER: MAHONEY, McCRACKEN, VARION, Check DATE: 9/14/2018

EE SCSS	AXIAL GAP (Inches)	RADIAL GAP (Inches)	TE SCSS	AXIAL GAP (Inches)	RADIAL GAP (Inches)
1	.040	.040	1	.043	.039
2	.046	.050	2	.046	.037
3	.050	.050	3	.043	.034
4	.040	.040	4	.040	.037
5	.058	.056	5	.041	.035
6	.040	.046	6	.046	.022
7	.022	.038	7	.039	.020
8	.034	.070	8	.040	.012
9	.040	.040	9	.040	.017
10	.060	.050	10	.040	.018
11	.056	.046	11	.040	.017
12	.036	.020	12	.022	.037
13	.056	.002	13	.036	.012
14	.0015	.020	14	.034	.008
15	.030	.034	15	.034	.025
16	.026	.030	16	.038	.028
17	.081	.008	17	.040	.027
18	.086	.080	18	.041	.037
19	.073	.030	19	.065	.049
20	0.068	.020	20	.072	.054
21	0.066	.014	21	.070	.040

NOTE: Plates are numbered with No. 1 at 12 o'clock position and progressing clockwise facing end winding. Could not access readings on Turbine end due to tuning weights.

FLEX PLATE OR STOP STUD TO CORE SUPPORT PLATE GAP MEASUREMENTS

CUSTOMER: FPL

STATION/UNIT: ST. LUCIE 2 S.O. NO.: 81P830

TESTER: McCRACKEN, Varion, Check, Thomas DATE: 9/16/2018

The following datasheet shows the SCSS gap measurement

EXCITER END SCSS	AXIAL GAP (Inches)	RADIAL GAP (Inches)	TURBINE END SCSS	AXIAL GAP (Inches)	RADIAL GAP (Inches)
1	.066	.056	1	.103	.043
2	.056	.047	2	.086	.044
3	.066	.053	3	.106	.045
4	.041	.051	4	.084	.045
5	.074	.057	5	.079	.029
6	.056	.058	6	.072	.028
7	.038	.039	7	.075	.026
8	.047	.061	8	.075	.031
9	.058	.043	9	.071	.033
10	.072	.060	10	.069	.032
11	.053	.073	11	.030	.063
12	.024	.045	12	.067	.031
13	.0025	.066	13	.066	.076
14	.008	.023	14	.070	.031
15	.047	.025	15	.085	0.33
16	.041	.039	16	.072	.088
17	.071	.026	17	.074	.031
18	.072	.034	18	.095	.031
19	.076	.122	19	.092	.027
20	.078	.023	20	.100	.033
21	.066	.033	21	.097	.028

NOTE: Plates are numbered with No. 1 at 12 o'clock position and progressing clockwise facing end winding. Could not access readings on Turbine end due to tuning weights.

0054BUILDING BOLT THREAD PROTRUSION

CUSTOMER: FPL S.O. NO.: 81P830

STATION: St Lucie UNIT NO.: 2

TESTER: Hank, Varion, Thomas, Check DATE: 18 Sept 2018

NOTE: EXCITER END

BOLT NO.	THREADS EXPOSED BEYOND NUT FACE	
	BEFORE TIGHTENING	AFTER TIGHTENING
1	2	2
2	2	2
3	2	3
4	2	2
5	2	2
6	3	3
7	3	3
8	2	3
9	3	3
10	3	3
11	1	2
12	2	3
13	2	2
14	2	2
15	2	3
16	2	2
17	2	3
18	2	3
19	2	3
20	1	3
21	2	2
22	1	2
23	1	2
24	1	2

BOLT NO.	THREADS EXPOSED BEYOND NUT FACE	
	BEFORE TIGHTENING	AFTER TIGHTENING
25	2	2
26	1	2
27	1	2
28	1	2
29	2	3
30	2	3
31	3	3
32	1	2
33	2	3
34	2	3
35	2	3
36	2	3
37	2	3
38	2	3
39	2	3
40	1	2
41	2	2
42	1	2

0054BUILDING BOLT THREAD PROTRUSION

CUSTOMER: FPL S.O. NO.: 81P830

STATION: St Lucie UNIT NO.: 2

TESTER: Hank, Varion, Thomas, Check DATE: 18 Sept 2018

NOTE: TURBINE END

BOLT NO.	THREADS EXPOSED BEYOND NUT FACE	
	BEFORE TIGHTENING	AFTER TIGHTENING
1	9	2
2	11	2
3	10	2
4	3	4
5	3	3
6	8	3
7	3	5
8	9	4
9	10	2
10	10	2
11	10	4
12	10	3
13	10	3
14	4	3
15	4	2
16	4	3
17	2	2
18	2	2
19	1	2
20	4	3
21	4	4
22	4	4
23	8	3
24	9	3

BOLT NO.	THREADS EXPOSED BEYOND NUT FACE	
	BEFORE TIGHTENING	AFTER TIGHTENING
25	9	3
26	9	3
27	9	3
28	4	3
29	4	3
30	3	3
31	3	3
32	5	4
33	5	5
34	4	4
35	4	4
36	10	3
37	4	3
38	2	3
39	2	3
40	2	3
41	2	3
42	9	4

NOTE: Bolts are numbered with No. 1 at 12 o'clock position and progressing clockwise as viewed from respective end of unit.

BRUSHLESS EXCITER FUSE RESISTANCE DATA

CUSTOMER: FPL STATION/UNIT: ST LUCIE S.O. NO.: 75P656R

TEST INSTRUMENT: DRLO INSTRUMENT NO.: 10001158 CALIBRATION DUE DATE: 8/9/2019

ENGINEER: MAHONEY DATE: 8/28/2018 AMBIENT TEMPERATURE: 36.7 °C = T $R_{25°C} = R_T (1.095 - .0038T)$

PMG SIDE (Readings in Microhms)				COUPLING SIDE (Readings in Microhms)			
FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25				FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25			
MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms				MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms			
FUSE NO.	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**	**FUSE NO.**	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**
1	148	141	-	1	146	140	-
2	147	140	-	2	146	140	-
3	151	144	-	3	148	141	-
4	147	140	-	4	151	144	-
5	151	144	-	5	148	141	-
6	148	141	-	6	147	140	-
7	150	143	-	7	150	143	-
8	151	144	-	8	149	142	-
9	150	143	-	9	146	140	-
10	148	141	-	10	145	139	-
11	150	143	-	11	147	140	-
12	150	143	-	12	148	141	-
13	149	142	-	13	148	141	-
14	147	140	-	14	150	143	-
15	146	140	-	15	146	140	-
16	147	140	-	16	153	146	-
17	150	143	-	17	149	142	-
18	149	142	-	18	150	143	-
19	150	143	-	19	148	141	-
20	147	140	-	20	146	140	-
21	148	141	-	21	152	145	-
22	148	141	-	22	147	140	-
23	152	145	-	23	149	142	-
24	149	142	-	24	149	142	-

BRUSHLESS EXCITER FUSE RESISTANCE DATA

CUSTOMER: FPL STATION/UNIT: ST LUCIE S.O. NO.: 75P656R

TEST INSTRUMENT: DRLO INSTRUMENT NO.: 10001158 CALIBRATION DUE DATE: 8/9/2019

ENGINEER: MAHONEY DATE: 8/28/2018 AMBIENT TEMPERATURE: 36.7 °C = T $R_{25°C} = R_T (1.095 - .0038T)$

PMG SIDE (Readings in Microhms)				COUPLING SIDE (Readings in Microhms)			
FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25				FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25			
MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms				MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms			
FUSE NO.	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**	**FUSE NO.**	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**
25	153	146	-	25	153	146	-
26	149	142	-	26	145	139	-
27	152	145	-	27	146	139	-
28	151	144	-	28	145	139	-
29	152	145	-	29	148	141	-
30	149	142	-	30	145	139	-
31	151	144	-	31	147	140	-
32	151	144	-	32	143	137	-
33	150	143	-	33	149	142	-
34	146	139	-	34	149	142	-
35	147	140	-	35	145	139	-
36	151	144	-	36	147	140	-
37	152	145	-	37	149	142	-
38	147	140	-	38	150	143	-
39	147	140	-	39	150	143	-
40	150	143	-	40	148	141	-
41	146	139	-	41	146	139	-
42	147	140	-	42	148	141	-
43	147	140	-	43	149	142	-
44	146	139	-	44	148	141	-
45	149	142	-	45	147	140	-
46	147	140	-	46	156	149	-
47	149	142	-	47	146	139	-
48	150	143	-	48	146	139	-

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BRUSHLESS EXCITER FUSE RESISTANCE DATA

CUSTOMER: FPL STATION/UNIT: ST LUCIE S.O. NO.: 75P656R

TEST INSTRUMENT: DRLO INSTRUMENT NO.: 10001158 CALIBRATION DUE DATE: 8/9/2019

ENGINEER: MAHONEY DATE: 8/28/2018 AMBIENT TEMPERATURE: 36.7 °C = T $R_{25°C} = R_T (1.095 - .0038T)$

PMG SIDE (Readings in Microhms)				COUPLING SIDE (Readings in Microhms)			
FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25				FUSE IDENTIFICATION: AO60ARC 400C1G 7811D25			
MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms				MAXIMUM ACCEPTABLE RESISTANCE AT 25°C: 163 microhms			
FUSE NO.	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**	**FUSE NO.**	**AS READ (R_T)**	**CORRECTED TO 25°C ($R_{25°C}$)**	**LAST INSPECTION READING**
49	146	140	-	49	148	141	-
50	144	138	-	50	145	139	-
51	149	142	-	51	147	140	-
52	148	141	-	52	146	140	-
53	151	144	-	53	143	137	-
54	147	140	-	54	145	139	-
55	158	151	-	55	148	141	-
56	149	142	-	56	147	140	-
57	145	139	-	57	147	140	-
58	146	140	-	58	148	141	-
59	147	140	-	59	159	152	-
60	146	140	-	60	157	150	-

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BRUSHLESS EXCITER MARK II
DIODE RESISTANCE DATA

CUSTOMER: FPL STATION/UNIT: ST. LUCIE #2

TESTER(S): MAHONEY SHOP ORDER: 75P656

TEST INSTRUMENT: Analog Multimeter TEST / INSPECTION DATE: 8/31/2018

INSTRUMENT S/N: 10001084 CALIBRATION DUE DATE: 8/17/19

Mark which applies (**X**) : ___ Inboard Wheel (Coupling Side) X Outboard Wheel (PMG Side)

*Actual Diode Reverse Resistance = Meter As Read x 10,000 Multiplier

Heat Sink No.	Diode Forward Resistance (Ohms)	Diode Reverse Resistance		Heat Sink No.	Diode Forward Resistance (Ohms)	Diode Reverse Resistance	
		Meter As Read	*Actual (Kilohms)			Meter As Read	*Actual (Kilohms)
1	5.5	1000	10,000	31	5.5	2000	20,000
2	5.0	2000	20,000	32	5.5	2000	20,000
3	5.0	2000	20,000	33	5.5	2000	20,000
4	5.0	2000	20,000	34	5.5	2000	20,000
5	5.0	2000	20,000	35	5.5	2000	20,000
6	5.5	2000	20,000	36	5.0	2000	20,000
7	5.5	2000	20,000	37	6.0	2000	20,000
8	5.0	2000	20,000	38	6.0	2000	20,000
9	5.5	2000	20,000	39	5.5	2000	20,000
10	5.0	2000	20,000	40	5.5	2000	20,000
11	5.0	1000	10,000	41	6.0	2000	20,000
12	5.0	2000	20,000	42	5.5	2000	20,000
13	5.0	1000	10,000	43	5.5	2000	20,000
14	5.0	2000	20,000	44	5.5	2000	20,000
15	5.0	2000	20,000	45	5.0	2000	20,000
16	5.5	2000	20,000	46	5.5	300	3,000
17	5.0	1000	10,000	47	5.5	2000	20,000
18	5.0	2000	20,000	48	5.5	2000	20,000
19	5.0	2000	20,000	49	5.0	2000	20,000
20	5.0	2000	20,000	50	5.5	2000	20,000
21	5.0	2000	20,000	51	5.0	1000	10,000
22	5.5	2000	20,000	52	5.5	1000	10,000
23	5.5	2000	20,000	53	5.5	2000	20,000
24	5.5	500	5,000	54	5.0	2000	20,000
25	5.5	2000	20,000	55	5.0	2000	20,000
26	5.5	2000	20,000	56	5.5	2000	20,000
27	5.5	2000	20,000	57	5.0	1000	10,000
28	5.5	2000	20,000	58	5.0	2000	20,000
29	5.5	2000	20,000	59	5.0	2000	20,000
30	5.5	2000	20,000	60	5.0	2000	20,000

BRUSHLESS EXCITER MARK II
DIODE RESISTANCE DATA

CUSTOMER: FPL STATION/UNIT: ST. LUCIE #2

TESTER(S): MAHONEY SHOP ORDER: 75P656

TEST INSTRUMENT: Analog Multimeter TEST / INSPECTION DATE: 8/31/2018

INSTRUMENT S/N: 10001084 CALIBRATION DUE DATE: 8/17/19

Mark which applies (**X**) : X Inboard Wheel (Coupling Side) ___ Outboard Wheel (PMG Side)

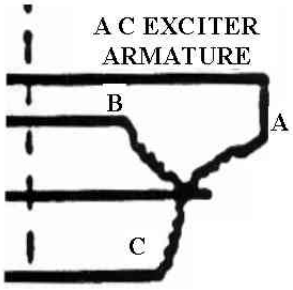
*Actual Diode Reverse Resistance = Meter As Read x 10,000 Multiplier

Heat Sink No.	Diode Forward Resistance (Ohms)	Diode Reverse Resistance		Heat Sink No.	Diode Forward Resistance (Ohms)	Diode Reverse Resistance	
		Meter As Read	*Actual (Kilohms)			Meter As Read	*Actual (Kilohms)
1	5.0	70	700	31	5.5	2000	20,000
2	5.5	300	3,000	32	6.0	2000	20,000
3	5.0	2000	20,000	33	5.0	2000	20,000
4	5.0	500	5,000	34	6.0	2000	20,000
5	5.0	2000	20,000	35	5.0	2000	20,000
6	5.0	2000	20,000	36	5.0	2000	20,000
7	5.5	2000	20,000	37	5.5	2000	20,000
8	5.0	2000	20,000	38	5.0	2000	20,000
9	5.0	2000	20,000	39	5.0	2000	20,000
10	5.0	1000	10,000	40	5.0	2000	20,000
11	5.5	2000	20,000	41	5.0	2000	20,000
12	5.5	2000	20,000	42	5.0	2000	20,000
13	5.5	2000	20,000	43	5.0	2000	20,000
14	5.0	2000	20,000	44	5.0	2000	20,000
15	5.0	2000	20,000	45	5.5	2000	20,000
16	5.0	2000	20,000	46	5.5	2000	20,000
17	5.0	2000	20,000	47	5.5	500	5,000
18	5.0	2000	20,000	48	5.5	2000	20,000
19	5.5	2000	20,000	49	5.5	2000	20,000
20	5.5	500	5,000	50	5.0	1000	10,000
21	5.5	2000	20,000	51	5.0	2000	20,000
22	5.5	2000	20,000	52	5.0	1000	10,000
23	5.0	2000	20,000	53	5.5	1000	10,000
24	5.0	2000	20,000	54	5.0	2000	20,000
25	5.0	2000	20,000	55	5.5	2000	20,000
26	5.0	2000	20,000	56	5.0	2000	20,000
27	5.0	2000	20,000	57	5.0	2000	20,000
28	5.0	2000	20,000	58	5.0	2000	20,000
29	5.5	2000	20,000	59	5.5	2000	20,000
30	5.5	2000	20,000	60	5.0	2000	20,000

BRUSHLESS EXCITER ARMATURE WINDING TEST DATA

CUSTOMER: FLORIDA POWER & LIGHT STATION: ST. LUCIE UNIT NO.: 2

S.O. NO.: 75P656R ENGINEER: MAHOINEY DATE: 8/28/2018



TEST INSTRUMENTS	INSTRUMENT SERIAL NO.'S	CALIB. DUE DATES
MEGGER	1000884	8/27/2019
DRLO	10001158	8/9/2019

ARMATURE WINDING RESISTANCE DATA

WINDING TEMPERATURE: 38.4 C

ARMATURE WINDING INSULATION RESISTANCE DATA

TEST VOLTAGE: 500 VDC

INSULATION RESISTANCE AT 1 MINUTE: 513 Megohms

WINDING RESISTANCE AVERAGE CORRECTED AT 75 C: 5198 microhms

ORIGINAL/PREVIOUS WINDING RESISTANCE AT 75 C: - microhms

ARMATURE WINDING RESISTANCES IN MICROHMS

LEAD NO.	RESISTANCE	LEAD NO.	RESISTANCE	LEAD NO.	RESISTANCE	LEAD NO.	RESISTANCE
1-2	4563	16-17	4592	31-32	4583	46-47	4581
2-3	4583	17-18	4577	32-33	4571	47-48	4585
3-4	4574	18-19	4559	33-34	4561	48-49	4583
4-5	4575	19-20	4562	34-35	4578	49-50	4590
5-6	4581	20-21	4569	35-36	4591	50-51	4568
6-7	4589	21-22	4592	36-37	4587	51-52	4575
7-8	4579	22-23	4592	37-38	4595	52-53	4583
8-9	4581	23-24	4609	38-39	4591	53-54	4573
9-10	4582	24-25	4602	39-40	4573	54-55	4573
10-11	4579	25-26	4603	40-41	4600	55-56	4572
11-12	4576	26-27	4612	41-42	4586	56-57	4573
12-13	4591	27-28	4579	42-43	4589	57-58	4550
13-14	4585	28-29	4580	43-44	4591	58-59	4591
14-15	4596	29-30	4597	44-45	4587	59-60	4583
15-16	4608	30-31	4602	45-46	4595	60-1	4567

DOUBLE WHEEL BRUSHLESS EXCITER
OPC 7C FPL COFFEY 000063

MODULE / HEAT SINK INSULATION RESISTANCES

CUSTOMER: FPL S.O. NO.: 75P656R

STATION: ST LUCIE UNIT NO.: 2

ENGINEER: MAHONEY DATE: 8/29/2018

MEGGER ID NO.: 10001084, PSL-0812 CALIBRATION DUE DATE: 8/17/2019, 10/14/2018

TEST VOLTAGE: 500 VOLTS D.C.

Inboard Wheel (Coupling Side)				Outboard Wheel (PMG Side)			
Mod./Heat Sink No.	Insulation Resistance (Megohms)	Mod./Heat Sink No.	Insulation Resistance (Megohms)	Mod./Heat Sink No.	Insulation Resistance (Megohms)	Mod./Heat Sink No.	Insulation Resistance (Megohms)
1	24	31	24	1	24	31	24
2	24	32	24	2	24	32	24
3	24	33	24	3	24	33	24
4	24	34	24	4	24	34	24
5	24	35	24	5	24	35	24
6	24	36	24	6	24	36	24
7	24	37	24	7	24	37	24
8	24	38	24	8	24	38	24
9	24	39	24	9	24	39	24
10	24	40	24	10	24	40	24
11	24	41	24	11	24	41	24
12	24	42	24	12	24	42	24
13	24	43	24	13	24	43	24
14	24	44	24	14	24	44	24
15	24	45	24	15	24	45	24
16	24	46	24	16	24	46	24
17	24	47	24	17	24	47	24
18	24	48	24	18	24	48	24
19	24	49	24	19	24	49	24
20	24	50	24	20	24	50	24
21	24	51	24	21	24	51	24
22	24	52	24	22	24	52	24
23	24	53	24	23	24	53	24
24	24	54	24	24	24	54	24
25	24	55	24	25	24	55	24
26	24	56	24	26	24	56	24
27	24	57	24	27	24	57	24
28	24	58	24	28	24	58	24
29	24	59	24	29	24	59	24
30	24	60	24	30	24	60	24

All Heat Sinks are tied together

Inboard Wheel – Shaft: 130 Megohms Outboard Wheel – Shaft: 144 Megohms

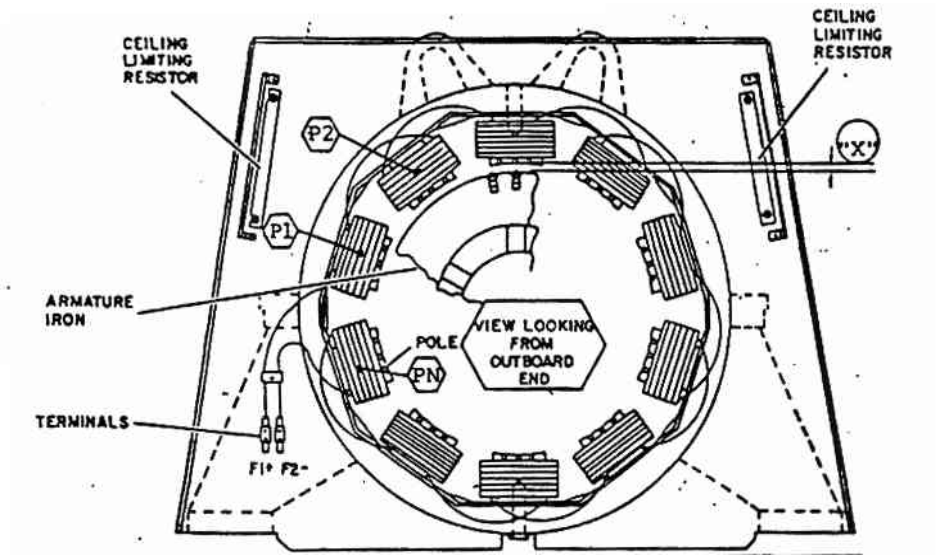
Inboard Wheel – Outboard Wheel: 69.7 Megohms

BRUSHLESS EXCITER AIR GAP MEASUREMENTS

CUSTOMER: FPL S.O. NO.: 76P0136

STATION: ST. LUCIE UNIT NO.: 2

TESTER: GODFREY, RUSHER, VARION DATE: 9/15/2018



AIR GAP CLEARANCES (inches)					
POSITION	INBOARD	OUTBOARD	POSITION	INBOARD	OUTBOARD
P1	.251	.234	P11	.202	.210
P2	.239	.237	P12	.224	.212
P3	.242	.238	P13	.220	.229
P4	.234	.262	P14	.240	.210
P5	.211	.256	P15	.235	.242
P6	.217	.261	P16	.245	.219
P7	.222	.243	P17	.260	.218
P8	.206	.250	P18	.260	.224
P9	.204	.243	P19	.249	.225
P10	.209	.218	P20	.240	.227

ASSEMBLY DOCUMENTS USED: N/A

READINGS TAKEN BY: RUSHER, GODFREY, VARION DATE: 9/16/2018

READINGS REVIEWED BY: DON MAHONEY DATE: 9/16/2018

BRUSHLESS EXCITER STATOR (FIELD) WINDING TEST DATA

CUSTOMER: FPL STATION: ST LUCIE UNIT NO.: 2

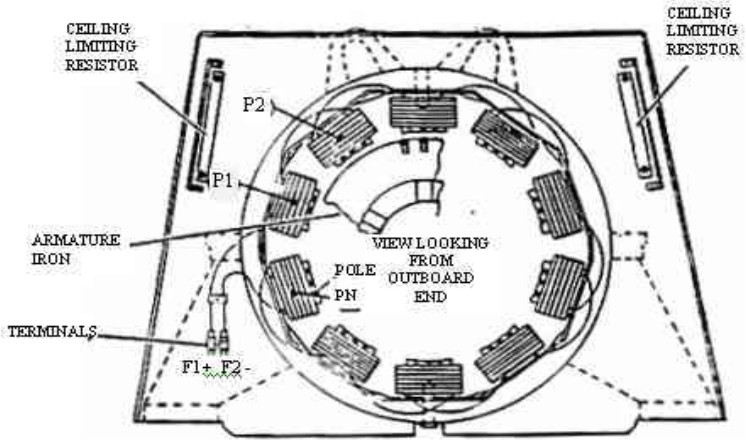
S.O. NO.: 76P0136 ENGINEER: BALLINSAS DATE: 9/10/2018

TEST INSTRUMENTS: DRLO, AVO MEGGER, DIGITAL ROTOR POLE DROP TEST SET,

INSTRUMENT S/N: 10523890, 10524390, 10000457,

CALIBRATION DUE DATES: 8/9/2019, 8/27/2019, 5/3/2019

(√) _____ AS FOUND MEASUREMENTS, X AS LEFT MEASUREMENTS



NOTE 1: AS LEFT MEASUREMENTS ARE REQUIRED IF LIMIT RESISTOR / FIELD POLE ASSEMBLY (F1-F2) CIRCUIT IS DISTURBED DURING OUTAGE.

NOTE 2: IF ROTOR IS INSTALLED, ENSURE ROTOR IS CENTERED IN STATOR PRIOR TO TAKING POLE BALANCE MEASUREMENTS.

F1 -F2 CIRCUIT DISTURBED DURING OUTAGE? (YES/NO) YES

(√) X Rotor In Stator, _____ Rotor Out Of Stator

AC STATOR WINDING RESISTANCE DATA		
F1-F2 RESISTANCE (WITH RESISTORS):	-	Ohms
WINDING RESISTANCE W/O RESISTORS:	0.061	Ohms
WINDING TEMPERATURE (°C):	30	°C
RESISTANCE W/O RESISTORS AT 75°C:	0.0708	Ohms
ORIGINAL RESISTANCE AT 75°C:	0.0708	Ohms
LIMITING RESISTOR RESISTANCE:	-	Ohms
ORIGINAL LIMITING RESISTOR RESISTANCE:	-	Ohms

AC STATOR WINDING INSULATION RESISTANCE		
TEST VOLTAGE:	500	Volts
INSULATION RESISTANCE AT 1 MIN.:	23.40	Megohms

AC STATOR WINDING IMPEDANCE DATA		
AC VOLTS (V):	**125.0**	Volts
AMPERES (I):	**4.3**	Amps
IMPEDANCE (V/I):	**29.1**	Ohms

AC EXCITER POLE BALANCE DATA			
POLE No.	VOLTAGE DROP (VAC)	POLE No.	VOLTAGE DROP (VAC)
P1	6.29	P13	5.49
P2	6.70	P14	5.46
P3	6.89	P15	5.33
P4	7.23	P16	5.28
P5	7.62	P17	5.36
P6	7.38	P18	5.52
P7	7.15	P19	5.86
P8	7.11	P20	6.04
P9	6.88	P21	
P10	6.38	P22	
P11	6.07	P23	
P12	5.91	P24	

Key:

$R_{75°C}$ = Resistance Corrected to 75° C

Rm = Measured Resistance

T = Temperature in °C

$$R_{75\,°C} = R_m \left[\frac{309.5}{234.5 + T} \right]$$

°C = 0.555 (°F - 32)

BRUSHLESS EXCITER STATOR (FIELD) WINDING TEST DATA

CUSTOMER: FPL STATION: ST LUCIE UNIT NO.: 2

S.O. NO.: 76P0136 ENGINEER: BALLINSAS DATE: 9/10/2018

TEST INSTRUMENTS: DRLO, AVO MEGGER, DIGITAL ROTOR POLE DROP TEST SET,

INSTRUMENT S/N: 10523890, 10524390, 10000457,

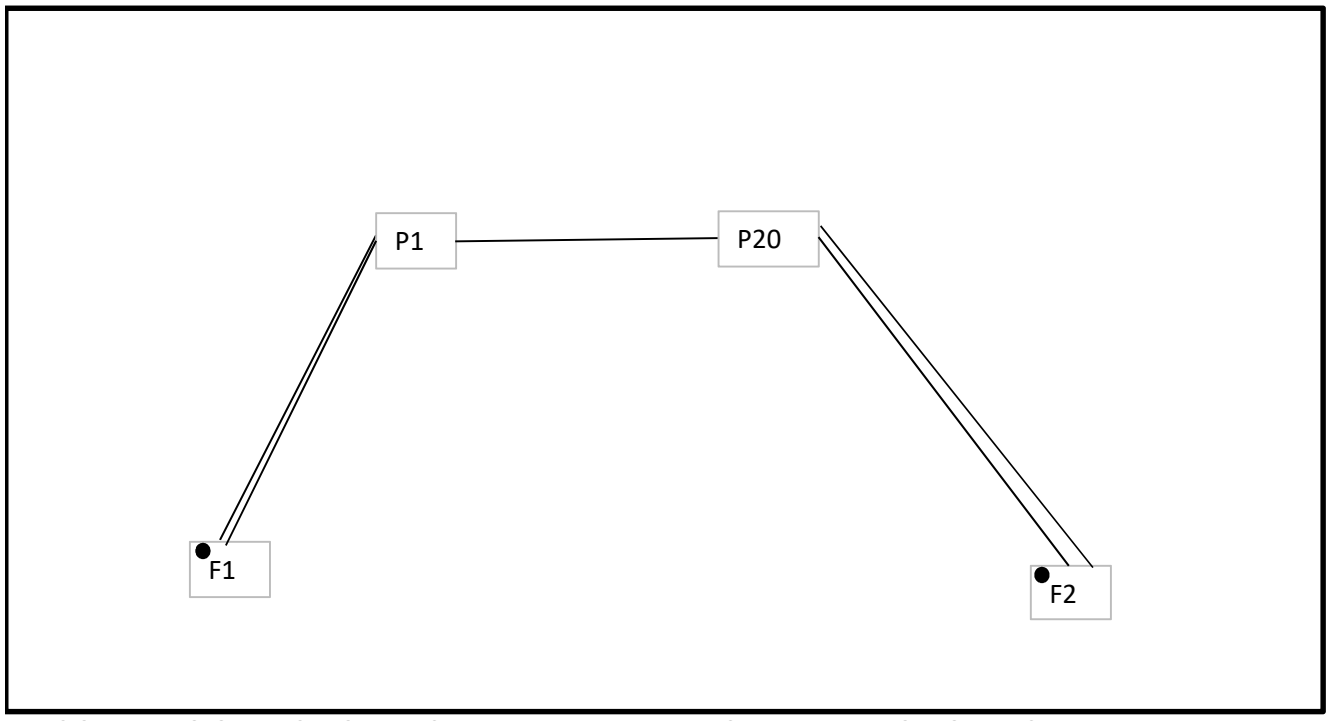
CALIBRATION DUE DATES: 8/9/2019, 8/27/2019, 5/3/2019

(√) _____ AS FOUND MEASUREMENTS, X AS LEFT MEASUREMENTS

NOTE: AS LEFT MEASUREMENTS ARE REQUIRED IF LIMIT RESISTOR / FIELD POLE ASSEMBLY (F1-F2) CIRCUIT IS DISTURBED DURING OUTAGE.

SKETCH CEILING LIMITING RESISTOR CONFIGURATION BELOW

INCLUDE ALL WIRES AND RESISTOR ELEMENTS



RECORD RESISTANCE OF EACH ELEMENT NEXT TO ELEMENT ON SKETCH

INSULATION RESISTANCE OF BEARING PEDESTAL: 4,25 Megohms

Completed after GS left site

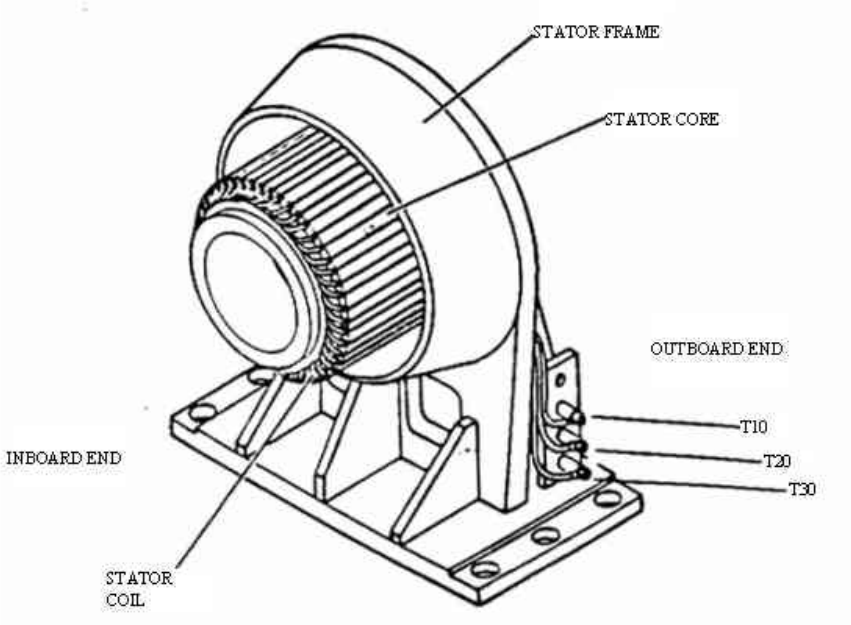
BRUSHLESS EXCITER PMG TEST DATA

CUSTOMER: FPL STATION: ST Lucie UNIT NO.: 2

S.O. NO.: ISJBE90643 ENGINEER: Ballinas DATE: 13 Sept 2018

LOW RESISTANCE OHMMETER ID NO.: 10523890 CALIB. DUE DATE: 09 Aug 2019

HAND MEGGER ID NO.: 10524390 CALIB. DUE DATE: 27 Aug 2019



PMG STATOR WINDING INSULATION RESISTANCE DATA

TEST VOLTAGE: 500 VDC

RESISTANCE @ 1 MINUTE: 2 Gigohms

$$R_{75\,^{\circ}C} = R_m \left[\frac{309.5}{234.5 + T} \right]$$

°C = 0.555 (°F - 32)

Key:

$R_{75°C}$ = Resistance Corrected to 75° C

Rm = Measured Resistance

T = Temperature in °C

PMG STATOR WINDING RESISTANCE DATA

PMG WINDING	MEASURED RESISTANCE AT 29.6 °C	CORRECTED RESISTANCE TO 75°C
T10 - T20:	0.00509 ohms	0.00597 ohms
T20 - T30:	0.00508 ohms	0.00596 ohms
T30 - T10:	0.00504 ohms	0.00591 ohms

AVERAGE CORRECTED RESISTANCE TO 75°C: 0.00594 ohms

ORIGINAL / PREVIOUS AVERAGE CORRECTED RESISTANCE TO 75°C: 0.00588 ohms