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Prepared for:



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Project Title:

TransCanada Keystone XL (KXL) Pipeline

Document Title:

**HV Transformer RFS-ITP Reporting
-PS07 - Piapot**

SIEMENS	
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1. Scope and Recommendations

The scope of this document is to present the findings and test data associated with the execution of the HV transformer RFS-ITP (Ready for Shipment – Inspection and Test Plan), associated with document SEI-KXL-TXF-0335-RFSITP.

2. Addendum-A: PS07-Piapot HV Transformer Test Results

See attached report from Shermco (206 pages) “20-S226-15-02” for the PS07-Piapot HV Transformer testing results.



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Siemens Energy Inc
HV Transformer ITP (Items 1.0 & 2.0)
Execution Canada
Piapot Transformer - Rev 0
Regina, SK
Jan 18, 2021
Shermco Project No. 20-S226-15-02



REVISION NOTES

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Jan 18th, 2021

Siemens Energy Canada Inc
1577 North Service Road East
Oakville, ON L6H 0H6
Canada

Subject: HV Transformer ITP Execution – Piapot (Items #1 & #2)

Attention: Mr. Robert Ellis

Dear Mr. Robert Ellis:

The services of Shermco Industries were commissioned to execute the approved ITP (Rev 4) for Item #1 (Physical/Mechanical Inspection of Assembled Transformer) and Item #2 (Electrical Testing) for the Piapot HV Transformer. This report highlights specific details found during the execution of the ITP and shows the completion of each item.

- ITP filled out and commented
- Inspection photos
- Electrical test sheets
- Test equipment calibration certificates

We would like to take this opportunity to thank you for using the services of Shermco Industries. If you require any additional information, please contact our office at your convenience.

Sincerely,

Shermco Industries
Regina Service Center



Brad Temple
EIT | Electrical Engineer

Physical/Mechanical Inspection

The transformer underwent an inspection as per the activities outlined in item 1.0 in the inspection and test plan (HV XFMR RFS-ITP Process 1: Physical/Mechanical Inspection of Assembled Transformer).

The following is a list of deficiencies found during the inspection of the transformer,

- 1) Control voltage issue with Fans. Voltage sound to be 106 VAC.
- 2) LTC oil temperature did not have a set point.
- 3) Minor oil leak found from breather.
- 4) Lamp was not working inside of control cabinet (Lamp 1).
- 5) Fan junction box had a broken incoming connection.
- 6) Minor oil leak found on secondary bushings.
- 7) X2 bushing's threads are damaged. X2 bushing paddle is missing.
- 8) Cover for secondary cabinet is extremely warped.
- 9) Minor rust and paint wear found throughout the tank of the transformer.
- 10) HV bushings have oil leaks at the flanges.
- 11) Radiators are leaking oil.
- 12) H2 & H3 radiators are missing support cross bracing.
- 13) Transformer tank is unable to maintain pressure. Leaking to atmosphere.
- 14) Nitrogen bottle is empty.

The transformer components and compartments were cleaned as outlined in the ITP.

Oil samples were taken and analyzed for the transformer and load tap changers. Lab tests determined that the oil is in good condition for both and can be used for routine operations.

Electrical Testing

The transformer was subjected to the electrical tests outlined in item 2.0 in the inspection and test plan (HV XFMR RFS-ITP Process 2: Electrical Testing).

A summary of electrical testing performed is as follows,

- 1) Insulation-resistance tests
- 2) Core insulation test
- 3) Power-factor/dissipation-factor tests on windings
- 4) Power-factor/dissipation-factor tests on bushings
- 5) Winding resistance testing on HV & LV windings
- 6) Turns-ratio test/verification on all tap positions
- 7) Excitation current tests
- 8) Sweep Frequency Response Analysis (SFRA) testing
- 9) Insulation-resistance tests on each surge arrester
- 10) Current transformer testing
 - a. Excitation test
 - b. Ratio test
 - c. Winding resistance

Test data was recorded with automatically generated datasheets or entered manually into standard Shermco test sheets. All test data has been appended to this report.

Insulation-Resistance test results rendered polarization index values less than 2.0 and slightly higher than 1.0. The polarization index numbers do not state failure but are not considered to be ideal. Previous testing on Nov.26/2015 gave the following values,

- Primary to Secondary (Ground) PI = 1.411
- Secondary to Primary (Ground) PI = 2.209

The values from the recent testing are lower but are still satisfactory as per the acceptance criteria outlined in the ITP.

The Doble test set had a few imperfect test results while doing power factor testing on the HV bushings. The measured capacitance values for H2 and H3 varied from the name plate capacitance during testing. However, there was about a 1% variance. Therefore, the results are satisfactory since the capacitance values do not vary by 5% of the nameplate values.

Conclusion

The results from executing the ITP determine that the transformer for Piapot (127-PIAPT-A0-T-01) is not fit for service.

Oil leaks were found in the following areas,

- Breather
- Secondary bushings
- Radiators
- HV bushing flanges

Also, the transformer was unable to maintain pressure and had leaked to atmosphere. Oil leaks in transformers are commonly caused by deteriorated gaskets and seals. It is recommended that the gaskets and seals in the referenced areas be evaluated and replaced/repared.

The cover for the secondary cabinet was found to be extremely warped. It is recommended to replace the cover to potentially keep unwanted moisture and other elements from getting inside the cabinet.

The threads for the X2 bushing were found to be damaged and the X2 bushing paddle is missing. The threads need to be remediated and a new bushing paddle needs to be supplied.

H2 & H3 radiators are missing support cross bracing. Installing the proper support bracing is recommended.

The cooling fans have a control voltage issue that is inhibiting the operation of the fans. The control voltage was found to be 106VAC. This issue requires further investigation to be fixed so that the fans can operate as expected.

The electrical testing reported good results which conform to the acceptance criteria outlined in the ITP. Polarization index values were found to be less than ideal but still pass the acceptance criteria. Polarization index should be evaluated in the future to ensure that the values do not fall below 1.0. The transformer is electrically fit for service.

Remediation of the transformer is recommended as it is not ready to be placed into service in its present state.



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Appendix A: Inspection & Test Plan

Prepared By: _____

Prepared for: _____



Project Information:

Project Reference:

20-S226-11

Project Title:

TC Energy Keystone XL (KXL) Pipeline

Document Title:

**High Voltage Transformer (HV XFMR)
Ready for Service – Inspection & Test Plan (RFS-ITP)**

Piapot: 127-PIAPT-A0-T-01

4	2April2020	Revised as per TC's comments	BT	DD	TH
3	24Feb2020	Revised as per TC's comments	BT	DD	TH
2	11Feb2020	Revised & remade by Shermco	BT	DD	TH
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Document Title High Voltage Transformer (HV XFMR)– Ready for Service – Inspection & Test Plan (RFS-ITP)			Document No. SEI-KXL-TXF-0335-RFSITP		Rev 4

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1. Recommendations and Scope

Due to the amount of time that the High Voltage Transformers have been sitting in storage, Siemens is wanting to hand the equipment over as trouble free as possible to TC-Energy's pre-commissioning team. The following document details the recommended "Ready for Service – Inspection & Test Plan" (RFS-ITP) that Siemens would execute at the storage facility prior to handing the equipment over to TC-Energy's pre-commissioning team. Another component of this document is to detail the preparation process for shipping and receiving the equipment.

Details of each of the processes and procedures can be found within Section-4 "HV XFMR Inspection and Test Plan Matrix". The High Voltage Transformers are not permitted to be placed into service until all "Acceptance Criteria" is met in Section-4.

This ITP document is for the three transformers stored in Canada (see section 3). However, the one stored in Soloman Kansas will follow a similar procedure.

2. Definitions

Definitions defined within the Inspection and Test Plan Matrix on the following pages:

Test Definitions:

CWT	Customer Witness Test	(Specific testing process completed with customer present)
FAT	Factory Acceptance Test	(Internal testing performed by the individual equipment supplier at their factories)
SAT	Site/Storage Acceptance Test	(Specific testing process completed at the site or storage facility)

Status Point Definitions:

H	Hold Point	(Inspection or testing point required)
R	Review Point	(Review of record/certificate only)
S	Surveillance Point	(Random attendance, no signature required)
W	Witness Point	(Attendance expected & signature to proceed only if in attendance)

3. List of Applicable Stations

Table-1 below shows the applicable stations that contain TC owned High Voltage Transformers (along with the quantity of motors/pumps used at that station) along with any status comments.

TABLE-1

#	Station Name	Station Country	Station Province/State	Number of Motors/Pumps (after expan.)	Comments/Station Status
1	PS-1 Hardisty B (for EES-10)	Canada	Alberta	3	No substation equipment at this site, no TXF RFS-ITP
2	PS-1 Hardisty B(for EES-11)	Canada	Alberta	3	No substation equipment at this site, no TXF RFS-ITP
3	PS-2 Lakesend East	Canada	Alberta	5	No substation equipment at this site, no TXF RFS-ITP
4	PS-3 Monitor South	Canada	Alberta	5	No substation equipment at this site, no TXF RFS-ITP
5	PS-4 Oyen South	Canada	Alberta	4	No substation equipment at this site, no TXF RFS-ITP
6	PS-5 Blindoss South	Canada	Alberta	5	No substation equipment at this site, no TXF RFS-ITP
7	PS-6 Fox Valley	Canada	Saskatchewan	5	Shermco – Regina Service Center, Regina, SK
8	PS-7 Piapot	Canada	Saskatchewan	5	Shermco – Regina Service Center, Regina, SK
9	PS-8 Grassy Creek	Canada	Saskatchewan	5	Shermco – Regina Service Center, Regina, SK
10	PS-9 Phillips	United States	Montana	5	No substation equipment at this site, no TXF RFS-ITP
11	PS-10 Valley	United States	Montana	5	No substation equipment at this site, no TXF RFS-ITP
12	PS-11 Fort Peck	United States	Montana	5	No substation equipment at this site, no TXF RFS-ITP
13	PS-12 Circle	United States	Montana	5	No substation equipment at this site, no TXF RFS-ITP
14	PS-13 Prairie	United States	Montana	4	No substation equipment at this site, no TXF RFS-ITP
15	PS-14 Fallon	United States	Montana	5	No substation equipment at this site, no TXF RFS-ITP
16	PS-15 Harding	United States	South Dakota	5	No substation equipment at this site, no TXF RFS-ITP
17	PS-16 Buffalo	United States	South Dakota	4	No substation equipment at this site, no TXF RFS-ITP
18	PS-17 Faith	United States	South Dakota	5	No substation equipment at this site, no TXF RFS-ITP
19	PS-18 Haakon	United States	South Dakota	4	No substation equipment at this site, no TXF RFS-ITP
20	PS-19 Murdo	United States	South Dakota	5	No substation equipment at this site, no TXF RFS-ITP
21	PS-20 Winner	United States	South Dakota	5	No substation equipment at this site, no TXF RFS-ITP
22	PS-21 Colome	United States	South Dakota	5	No substation equipment at this site, no TXF RFS-ITP
23	PS-22R O'Neill (orig Atkinson)	United States	Nebraska	5	No substation equipment at this site, no TXF RFS-ITP
24	PS-23R Oakdale (orig Ericsson)	United States	Nebraska	5	No substation equipment at this site, no TXF RFS-ITP
25	PS-23B Leigh	United States	Nebraska	3	No substation equipment at this site, no TXF RFS-ITP
26	PS-24 Bellwood (orig Central City)	United States	Nebraska	5	No substation equipment at this site, no TXF RFS-ITP
27	PS-25 Milford (orig Exter)	United States	Nebraska	5	No substation equipment at this site, no TXF RFS-ITP
28	PS-26 Steele City B	United States	Nebraska	5	No substation equipment at this site, no TXF RFS-ITP
29	PS-27 Riley	United States	Kansas	4	No substation equipment at this site, no TXF RFS-ITP
30	PS-29 Burns	United States	Kansas	4	Solomon, KS
31	PS-32 Cushing South	United States	Oklahoma	4	No substation equipment at this site, no TXF RFS-ITP
32	PS-33 Cromwell	United States	Oklahoma	4	No substation equipment at this site, no TXF RFS-ITP
33	PS-34 Tupelo	United States	Oklahoma	4	No substation equipment at this site, no TXF RFS-ITP
34	PS-35 Bryan	United States	Oklahoma	4	No substation equipment at this site, no TXF RFS-ITP
35	PS-36 Delta	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP
36	PS-37 Winnsboro	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP
37	PS-38 Lake Tyler	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP
38	PS-39 Lufkin	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP
39	PS-40 Corrigan	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP
40	PS-41 Liberty	United States	Texas	4	No substation equipment at this site, no TXF RFS-ITP

4. HV XFMR Inspection and Test Plan Matrix

Project Information:		Siemens Representative Sign-off:		Customer Representative Sign-off:	
Project Name:	<u>HV Transformer ITP (1.0 - 2.0) Execution</u>	Name:	_____	Name:	_____
Project #:	<u>20-S226-15-02</u>	Title:	_____	Title:	_____
Customer Project #:	_____	Date:	_____	Date:	_____
Customer Contract #:	_____	Signature:	_____	Signature:	_____
Pump Sta. #/Name:	<u>Piapot (PS 07)</u>				
TXF Tag # & Serial #:	<u>127-PIAPT-A0-T-01</u>				

Legend (for "Type" and "Verification Point")															
Test Type:		CWT=Customer Witness Point		SAT=Storage Acceptance Test		FAT=Factory Acceptance Test		(See section 2.0 of this document for description details)							
Verification Point:		H=Hold Point		R=Review Point		S=Surveillance Point		W=Witness Point (See section 2.0 of this document for description details)							
Item #	Verification/Test Activity	Type			Acceptance Criteria				Verify Point						
		SAT	FAT	CWT	Requirement				Acceptance/NA/Comment	Siemens	Customer	Cust 3 rd	Factory		
TC Energy Keystone XL Project – High Voltage Transformer RFS-ITP Processes															
1.0 HV XFMR RFS-ITP Process 1: Physical/Mechanical Inspection of Assembled Transformer (Executed at storage facility prior to disassembly)															
1.1	Compare equipment nameplate with drawing/specification.	X			Verify that the information on the nameplate matches what is required from the specification.				✓	H	RS				
1.2	Look for any indication that Polychlorinated Biphenyls (PCBs) are present.	X			If any PCBs are present, ensure that there is appropriate labeling and signage to warn anyone working on or nearby the transformer.				✓	H	RS				
1.3	Inspect physical and mechanical condition (general inspection of transformer) <ul style="list-style-type: none"> Primary/Secondary termination points Lifting lugs Location Adequacy of painted components Junction boxes, panel(s), cabinet(s), & compartments Anchorage, alignment, and grounding 	X			Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.				Lifting lugs need to be inspected by an engineering specialist to ensure that they are capable of being lifted by a crane. -X2 missing bushing paddle -Secondary cabinet cover extremely warped -Fans JB has a broken incoming connection	H	RS				
1.4	Check the oil level and pressure indicators/gauges.	X			Determine whether the tank oil level and pressure are adequate to proceed with any electrical testing or operations.				If levels are inadequate, an oil fill processing procedure will need to be conducted.	H	RS				
1.5	Thoroughly scan the entire transformer for any oil & liquid leaking out of the transformer.	X			Verify that the transformer is not leaking anywhere, and liquid levels and pressure can be maintained. Verify that oil level & pressure are capable of being maintained.				Seals and gaskets may need to be repaired if oil level and pressure cannot be maintained. If so stop this procedure and determine the best course of action to repair/salvage the transformer.	H	RS				

Oil leaks found,
-Breather
-LV bushings
-HV bushing flange bolts
-Radiators

Transformer is unable to hold pressure. Leaked to atmosphere. Nitrogen bottle is empty.

1.6	<p>Take an oil sample and test for,</p> <ul style="list-style-type: none"> Dielectric Breakdown voltage Acid neutralization Interfacial tension Color Visual condition Water in insulating liquids <p>all in accordance with the appropriate ASTM D method/practice.</p>	X		<p>Verify that the oil inside the transformer is in accordance with the appropriate ASTM D method/practice. See ANSI/NETA ATS Table 100.4 for satisfactory test values.</p>	<p>May need to conduct an oil fill processing procedure. ✓</p> <p>If monthly inspections & testing (during storage) can confirm that the oil inside the transformer meets the acceptance criteria there is no need to take an oil sample.</p>	H	RS		
1.7	<p>If the oil sample testing passes, continue with the procedure.</p> <p>If the oil sample testing failed, conduct an approved oil fill processing procedure to fill the transformer. Before starting,</p> <ul style="list-style-type: none"> Check that all valves are in the proper position Check that all bushings and flanges are tight If any covers have been removed reattach them and ensure the transformer is sealed Proceed with an approved oil fill procedure 	X		<p>Confirm that the transformer is filled with oil that has passed testing for,</p> <ul style="list-style-type: none"> Dielectric Breakdown voltage Acid neutralization Interfacial tension Color Visual condition Water in insulating liquids <p>And is in accordance with the appropriate ASTM D method/practice. See ANSI/NETA ATS Table 100.4 for satisfactory test values.</p> <p>If oil fill processing was performed, ensure transformer is not leaking. Ensure oil level & pressure are capable of being maintained.</p>	<p>Seals and gaskets may need to be repaired if oil level and pressure cannot be maintained. If so stop this procedure and determine the best course of action to repair/salvage the transformer.</p>	H	RS		
1.8	<p>Inspect radiators.</p> <ul style="list-style-type: none"> Noticeable damage Condition of fins Condition of lifting lugs Seismic bracing 	X		<p>Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.</p>	<p>Radiators are in good condition. Gaskets need to be replaced. ✓</p>	H	RS		
1.9	<p>Inspect cooling fans</p> <ul style="list-style-type: none"> Noticeable damage Condition of fan blades 	X		<p>Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.</p>	<p>Power and control wiring shall be connected to fans when the radiators are on the transformer. ✓</p>	H	RS		
1.10	<p>Inspect, and clean the High Voltage Bushings.</p> <ul style="list-style-type: none"> Damage Cracks Condition of lifting lugs Use a suitable cleaner or an alcohol-soaked swab to wipe Wax the bushing after with collinite wax Contacts or any current carrying surfaces should be cleaned with an abrasive cloth or fine Scotch-Brite product in combination with an approved contact cleaner and contact lubricator. Use mobilgrease 28 if no recommended contact lubricant is specified. 	X		<p>Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.</p> <p>Verify that the bushing is clean and waxed.</p>	<p>If any part of the bushing is cracked or damaged, the bushing will need to be replaced. ✓</p>	H	RS		
1.11	<p>Check the internal oil levels of each High Voltage Bushing.</p>	X		<p>Validate that the oil level is adequate.</p>	<p>Bushing might need to be replaced if unable to be refilled (reimpregnation). ✓</p>	H	RS		

1.12	<p>Inspect, and clean the Low Voltage Bushings.</p> <ul style="list-style-type: none"> • Damage • Cracks • Condition of termination pads • Use a suitable cleaner or an alcohol-soaked swab to wipe • Wax the bushing after with collinite wax • Contacts or any current carrying surfaces should be cleaned with an abrasive cloth or fine Scotch-Brite product in combination with an approved contact cleaner and contact lubricator. 	X		<p>Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.</p> <p>Verify that the bushing is clean and waxed.</p>	<p>If any part of the bushing is cracked or damaged, the bushing will need to be replaced.</p> <p style="text-align: center;">✓</p>	H	RS		
1.13	<p>Unpack, inspect, and clean the Surge Arrestors.</p> <ul style="list-style-type: none"> • Damage • Cracks • Perform general cleaning • Wipe off dust <p>Perform an insulation-resistance test on each Surge Arrestor.</p>	X		<p>Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.</p> <p>Ensure that any required lifting devices are accessible and accounted for.</p> <p>Refer to ANSI/NETA ATS Table 100.1 for insulation-resistance test voltages and minimum insulation resistance value.</p> <p>Repackage after inspection, testing, and cleaning.</p>	<p>Damaged surge arrestors will need to be replaced.</p> <p>If the surge arrestor does not meet the minimum insulation-resistance value it will need to be replaced.</p> <p style="text-align: center;">✓</p>	H	RS		
1.14	<p>Clean the transformer</p> <ul style="list-style-type: none"> • Vacuum and wipe all enclosures & cabinets. • Wipe (dry rag) all insulation surfaces. Use of denatured alcohol is permitted if dry rag cannot clean insulation surfaces. • Contacts or any current carrying surfaces should be cleaned with an abrasive cloth or fine Scotch-Brite product in combination with an approved contact cleaner and contact lubricator. • Use mobilgrease 28 if no recommended contact lubricant is specified. 	X		<p>Validate the unit is clean</p> <ul style="list-style-type: none"> • No unnecessary debris • No buildup of dirt, soil, sand, or soot is allowed inside the mechanism box or any of the enclosures & cabinets • Contact points are lubricated 	<p>Do not use any solvents that may leave residue afterwards.</p> <p>This step can be done at any point of the procedure in Section 1.0</p> <p style="text-align: center;">✓</p>	H	RS		
1.15	<p>Inspect and investigate the alarm, control, & trip functions.</p> <ul style="list-style-type: none"> • Pressure/Vacuum gauge • Rapid pressure rise relay • Large pressure relief device • Oil level indicators/gauges • Oil & Winding temperature indicators 	X		<p>Confirm that all specified alarm, control, & trip functions exist and that the applicable devices are installed in the appropriate location.</p> <p>Verify alarm, control, and trip functions and indicators are as specified.</p>	<p style="text-align: center;">✓</p>	H	RS		
1.16	<p>Test the operations of alarm, control, and trip circuits.</p> <ul style="list-style-type: none"> • Pressure/Vacuum gauge • Rapid pressure rise relay • Large pressure relief device • Oil level indicators • Oil & Winding temperature indicators 	X		<p>Verify that the operations of alarm, control, and trip settings are working within manufacturer's recommendations.</p>	<p>PRD does not latch into trip state. Needs to be replaced. Resets by itself.</p> <p>PRD flag on LTC is broken.</p> <p>LTC oil temperature does not have a set point.</p> <p style="text-align: center;">↑</p>	H	RS		
					<p>Other alarm, control, and trip circuits worked as expected.</p>				

1.17	Perform Operational testing <ul style="list-style-type: none"> Fans Breathers (silica gel or drycol) Temperature gauges (oil & winding) Gas actuated relays 	X		Verify that each item operates correctly and has adequate overcurrent protection (if applicable).	Fans are not working due to a control voltage issue. Fan Voltage found to be 106VAC. Further investigation required.	H	RS		
1.18	Compare Load Tap-Changer equipment nameplate with drawing/specification.	X		Verify that the information on the nameplate matches what is required from the specification.	Include both High Voltage and Load Side load tap changers. ✓	H	RS		
1.19	Inspect physical and mechanical condition of the tap changer. <ul style="list-style-type: none"> Condition of the enclosure Overall condition of visible components Moving parts have adequate lubrication Anchorage, alignment, and grounding 	X		Validate no physical abnormalities exist. Where abnormalities are identified, photos shall be taken for record and engineering review.	Include both High Voltage and Load Side load tap changers. ✓ LTC was not working properly. ✓ Contactors in the control circuit were found out of position preventing proper operation. This was repaired.	H	RS		
1.20	Clean the LTC enclosure <ul style="list-style-type: none"> Vacuum Wipe (dry rag) all insulation surfaces. Use of denatured alcohol is permitted if dry rag cannot clean insulation surfaces. Adequately lubricate moving parts if required 	X		Validate the unit is clean <ul style="list-style-type: none"> No unnecessary debris No buildup of dirt, soil, sand, or soot is allowed inside the mechanism box or any of the enclosures & cabinets 	Do not use any solvents that may leave residue afterwards. ✓ This step can be done at any point of the procedure in Section 1.0 Include both High Voltage and Load Side load tap changers.	H	RS		
1.21	Record the "as-found" operation counter reading.	X		Write down the counter reading.	Include both High Voltage and Load Side load tap changers. 2201 ✓	H	RS		
1.22	Check the Load Tap-Changer oil level and pressure indicators/gauges.	X		Make the assessment and determine whether the tank oil level and pressure are adequate to proceed with any operational testing.	Include both High Voltage and Load Side load tap changers. ✓	H	RS		
1.23	Inspect the operation of the following, <ul style="list-style-type: none"> Motor Drive train Cutoff at maximum raise position Cutoff at maximum lower position 	X		Verify that the motor can physically change the current tap setting. Verify that the motor does not attempt to raise beyond the maximum raise position and does not attempt to lower below the maximum lower position. Note any abnormal noises during operation.	Include both High Voltage and Load Side load tap changers. ✓ After repair LTC operated as expected.	H	RS		
<p>General Comments to Section 1.0</p> <p>-Part of this section is to perform a complete physical/mechanical inspection to determine if the transformer(s) can be placed into service</p> <p>-Part of this section is to evaluate the quality of oil that has been sitting in the transformer(s), and replace it if necessary</p> <p>-Evaluating the condition and operations of the Load Tap-Changer(s)</p>									

Legend (for "Type" and "Verification Point")										
Test Type:		CWT=Customer Witness Point	SAT=Storage Acceptance Test	FAT=Factory Acceptance Test	(See section 2.0 of this document for description details)					
Verification Point:		H=Hold Point	R=Review Point	S=Surveillance Point	W=Witness Point	(See section 2.0 of this document for description details)				
Item #	Verification/Test Activity	Type			Acceptance Criteria			Verify Point		
		SAT	FAT	CWT	Requirement	Acceptance/NA/Comment	Siemens	Customer	Cust 3 rd	Factory
TC Energy Keystone XL Project – High Voltage Transformer RFS-ITP Processes										
2.0 HV XFMR RFS-ITP Process 2: Electrical Testing (Executed at storage facility prior to disassembly)										
2.1	Perform the following insulation-resistance tests, <ul style="list-style-type: none"> Winding-to-winding Winding-to-ground 	X			Reference ANSI/NETA ATS Table 100.5 for minimum applied DC test voltages. When tests are completed calculate the polarization index. Ideal polarization index is 2.0. Anything less than a polarization index of 1.0 is considered a fail and the transformer will have to be replaced or refurbished.	Prim to Sec (Ground) PI = 1.095 ✓ Sec to Prim (Ground) PI = 1.079 Both values marginally above a polarization index of 1.0.	H	RS		
2.2	Perform a core insulation test at 500VDC with respect to ground.	X			Compare the test result with manufacturer's data if available. The test value should not be less than 1MΩ.	If core ground strap is inaccessible disregard this step. ✓	H	RS		
2.3	Perform power-factor or dissipation-factor tests on all windings.	X			Verify that the test results are in accordance to the manufactures published data or ANSI/NETA ATS Table 100.3.	✓	H	RS		
2.4	Perform power-factor or dissipation-factor tests on each bushing equipped with a potential/capacitance tap. If there is no potential/capacitance tap available, perform hot-collar tests instead.	X			Verify that the test results do not vary from the nameplate values by more than 150%. Bushing capacitance values that vary from 5% of the nameplate value are unsatisfactory. Alternatively, hot-collar test values that exceed 0.1 watts are unsatisfactory.	If this test was completed earlier in the procedure, disregard this step. Double test set identified that the measured capacitance for H2 & H3 varied from the nameplate value. ✓ However, the variance was within the margin of the acceptance criteria.	H	RS		
2.5	Measure the resistance of each high-voltage winding in each de-energized tap-changer position.	X			Verify that there are no open connections. Ensure there are no severe differences in resistance between windings.	✓	H	RS		
2.6	Measure the resistance of each low-voltage winding in each de-energized tap-changer position.	X			Verify that there are no open connections. Ensure there are no severe differences in resistance between windings.	✓	H	RS		
2.7	Perform turns-ratio tests on all tap positions.	X			Verify that the turns-ratio of the transformer is consistent with the nameplate data. Test results should not deviate by more than 0.5 percent from either the adjacent coils or the calculated ratio.	✓	H	RS		
2.8	Perform excitation-current tests in accordance with test equipment manufacturer's published data.	X			Verify that there is no inter-turn shorting, core damage, or poor internal electrical connections. Results should have two similar current readings and one lower current reading.	✓	H	RS		
2.9	Perform sweep frequency response analysis tests (SFRA test).	X			Compare results to either the factory SFRA test results and/or previous SFRA test results.	✓	H	RS		
2.10	Record the "as-left" operation counter reading of the Load Tap-Changer.	X			Write down the counter reading.	✓	H	RS		
General Comments to Section 2.0 -The purpose of these electrical tests is to verify whether the Transformer(s) are serviceable before they are shipped. -If the Transformer(s) are deemed to have failed any of the Acceptance Testing Criteria, they would be considered non-serviceable. <ul style="list-style-type: none"> Components will need to be refurbished or be completely replaced in attempt to pass the Acceptance Testing Criteria. Once components have been refurbished/replaced, retest the Transformer(s) with the same procedure. 										



Shermco Industries®

One Line. One Company.®

Appendix B: Photos



84LX:A1

84RX:A2

84L:83

84L:54

84L:83

84R:54

84L:TB1.7

K1:28

84R:83

84L:83





K1:22

84L:54

90A1:TB1.9

84L:83

K1:20

86XR:22

84R:54

90A1:TB1.7

K1:28

84R:83

84LX:13

86RL:1.1

84L:42

84R:42

84LX

53 NO 61 NC 71 NC 83 NO

A-B

A22

54 NO 62 NC 72 NC 84 NO

53 NO 61 NC 71 NC 83 NO

A-B

A22

54 NO 62 NC 72 NC 84 NO

A-B

CF

14 NO 22 NC 32

84L:61

84L:2

K1:23

84L:84

84R:61

K1:21

K1:24

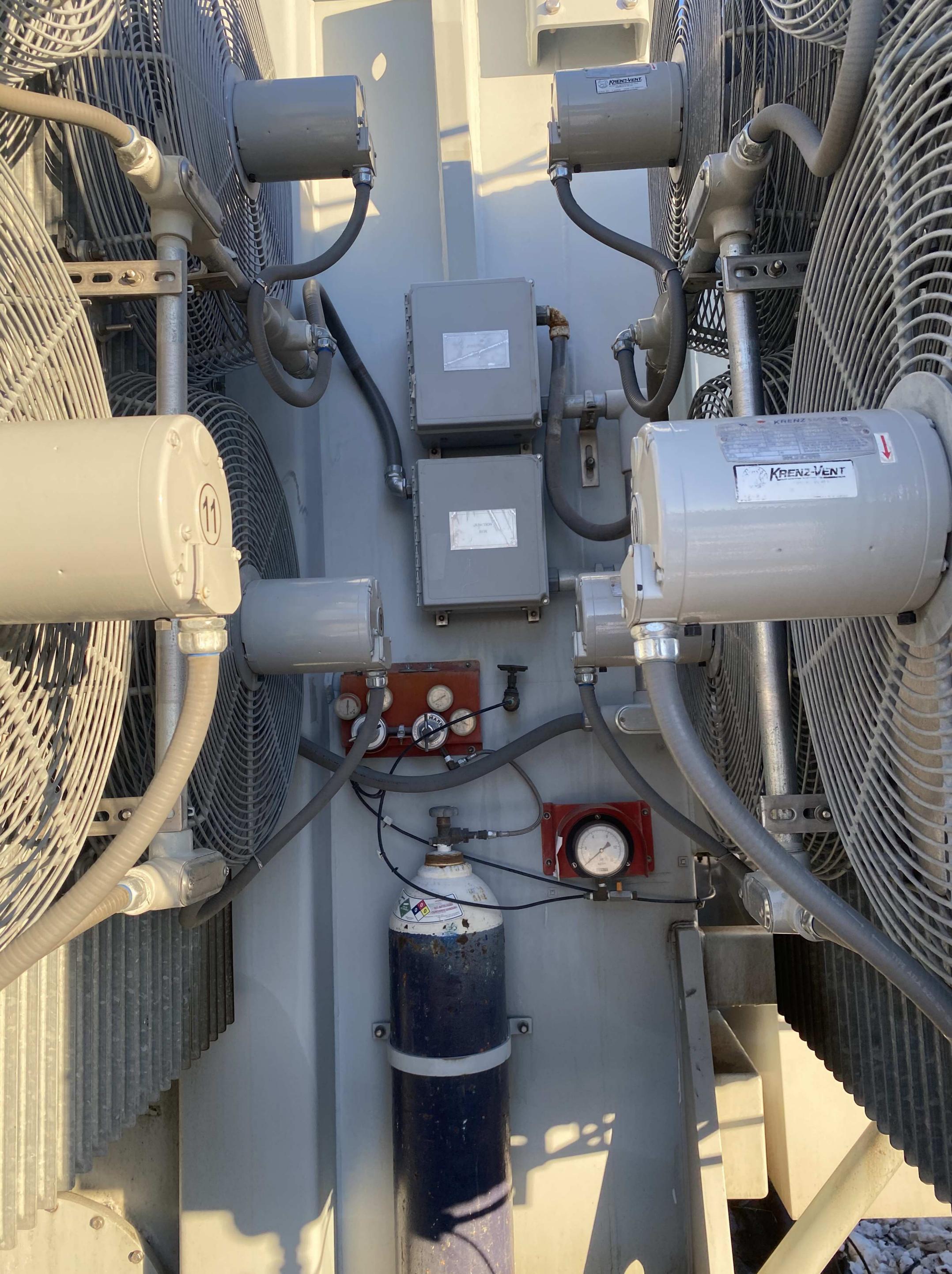
84R:84

K1:29

86X1:A1







KRENZ-VENT

ALL INFORMATION
HEREIN IS UNCLASSIFIED

ALL INFORMATION
HEREIN IS UNCLASSIFIED

KRENZ-VENT

HARDWARE

PSI

REFRIGERANT









WARNING
OFF-CIRCUIT SWITCH
OPERATE ONLY WHEN
TRANSFORMER IS
DE-ENERGIZED

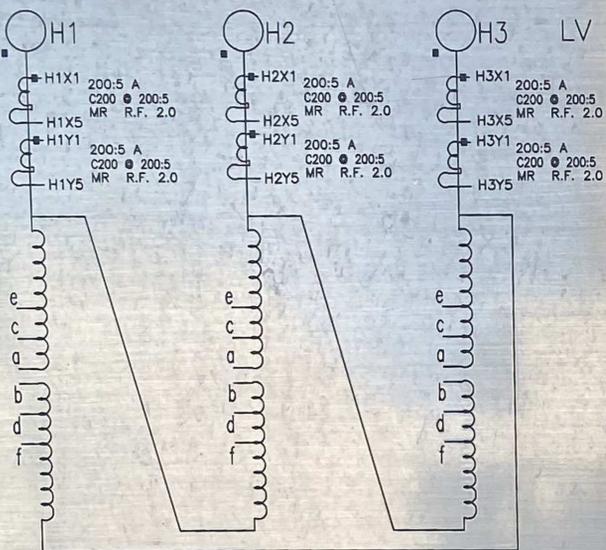
P INSTRUCTIONS: PULL RING, TURN HANDLE UNTIL
POINTER & ROTATING CAM ARE ALIGNED & LOCKING
PIN IS ENGAGED AT DESIRED TAP POSITION

DE-ENERGIZED TAP CHANGER
CAUTION
DO NOT OPERATE TAP
CHANGER WHEN TRANSFORMER
IS ENERGIZED
RECOMMENDED PRACTICE: WHEN CHANGING THE
TAP POSITION, FIRST MOVE TAP CHANGER
THROUGH ALL POSITIONS FINISHING ON
THE DESIRED POSITION. SEE OPERATION
MANUAL FOR DETAILS.

SIEMENS

SUBSTATION TRANSFORMER

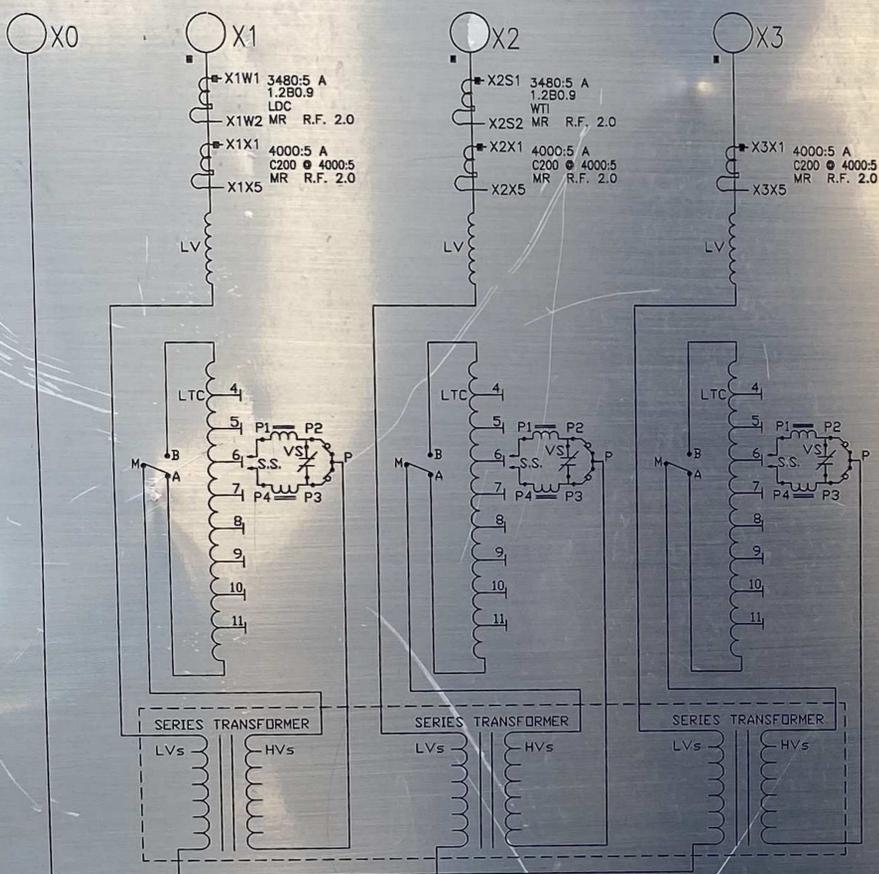
CLASS ONAN/ONAF/ONAF, 3 PHASES, 60 Hz, 55//65°C RISE
 HV 230000 Δ VOLTS, 20/22.4/26.66/29.86/33.33/37.33 MVA
 LV 6900 Grd Y/ 3983.7 VOLTS, 20/22.4/26.66/29.86/33.33/37.33 MVA



FULL WAVE IMPULSE LEVELS

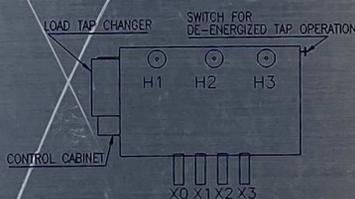
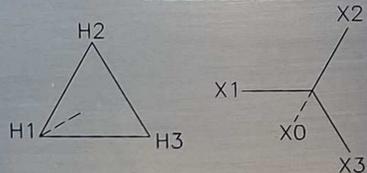
HV WINDING 825 kV, HV BUSHINGS 1050 kV
 LV WINDING 110 kV, LV BUSHINGS 110 kV
 LV NEUTRAL WINDING 110 kV, LV NEUTRAL BUSHING 110 kV
 H-X [7.099 %] IMPEDANCE BASED ON 20 MVA ON TAP 3

NO-LOAD TAP CHANGER	SWITCH JOIN	WINDING VOLTAGES AND CURRENTS				
		VOLTS	AMPERES			
			20 MVA	26.66 MVA	33.3 MVA	37.3 MVA
1	a-b	241500	48	64	80	89
2	b-c	235750	49	65	82	91
3	c-d	230000	50	67	84	94
4	d-e	224250	51	69	86	96
5	e-f	218500	53	70	88	99



LOAD-TAP CHANGER		CONNECTION		"X" WINDINGS VOLTAGES & CURRENTS					
LTC POSITION	P1 TO	P4 TO	M TO	VOLTS	AMPERES				
					20 MVA	26.66 MVA	33.3 MVA	37.3 MVA	
RAISE LV VOLTS	16R	11	11	7590	1521	2028	2533	2840	
	15R	10	11	7547	1530	2040	2548	2856	
	14R	10	10	7504	1539	2051	2562	2872	
	13R	9	10	7461	1548	2063	2577	2889	
	12R	9	9	7418	1557	2075	2592	2906	
	11R	8	9	7374	1566	2087	2607	2923	
	10R	8	8	7331	1575	2100	2622	2940	
	9R	7	8	7288	1584	2112	2638	2957	
	8R	7	7	7245	1594	2125	2654	2975	
	7R	6	7	7202	1603	2137	2670	2993	
	6R	6	6	7159	1613	2150	2686	3011	
	5R	5	6	7116	1623	2163	2702	3029	
	4R	5	5	7073	1633	2176	2718	3047	
	3R	4	5	7029	1643	2190	2735	3066	
	2R	4	4	6986	1653	2203	2752	3085	
	1R	M	4	6943	1663	2217	2769	3104	
N	N	M	M	B/A	6900	1573	2231	2786	3124
LOWER LV VOLTS	1L	11	M	6857	1684	2245	2804	3143	
	2L	11	11	6814	1695	2259	2822	3163	
	3L	10	11	6771	1705	2273	2840	3183	
	4L	10	10	6728	1716	2288	2858	3204	
	5L	9	10	6684	1727	2303	2876	3224	
	6L	9	9	6641	1739	2318	2895	3245	
	7L	8	9	6598	1750	2333	2914	3266	
	8L	8	8	6555	1762	2348	2933	3288	
	9L	7	8	6512	1773	2364	2952	3310	
	10L	7	7	6469	1785	2379	2972	3332	
	11L	6	7	6426	1797	2395	2992	3354	
	12L	6	6	6383	1809	2412	3012	3377	
	13L	5	6	6339	1821	2428	3033	3400	
	14L	5	5	6296	1834	2445	3054	3423	
	15L	4	5	6253	1847	2462	3075	3447	
	16L	4	4	6210	1859	2479	3096	3471	

PHASE RELATION



CURRENT TRANSFORMERS			
POS.	RATIO	CONNECTION	CLASS
HV	50:5 A	X3-X4	C200
	50:5 A	X1-X2	
	50:5 A	X4-X5	
	50:5 A	X2-X3	
	100:5 A	X2-X4	
	100:5 A	X1-X3	
LV	150:5 A	X1-X4	C200
	150:5 A	X2-X5	
	200:5 A	X1-X5	
	200:5 A	X1-X5	

CURRENT TRANSFORMERS			
POS.	RATIO	CONNECTION	CLASS
LV	500:5 A	X1-X2	C200
	1000:5 A	X3-X4	
	1500:5 A	X2-X3	
	2000:5 A	X1-X3	
	2500:5 A	X2-X4	
	3000:5 A	X1-X4	
LV	3500:5 A	X2-X5	C200
	4000:5 A	X1-X5	

CURRENT TRANSFORMERS			
POS.	RATIO	CONNECTION	CLASS
X1	3480:5 A	W1-W2	1.2B0.9

CURRENT TRANSFORMERS			
POS.	RATIO	CONNECTION	CLASS
X2	3480:5 A	S1-S2	1.2B0.9

NOTES

- 1) READ INSTRUCTION BOOK BEFORE INSTALLING AND ENERGIZING TRANSFORMER.
- 2) DO NOT OPERATE THE TRANSFORMER WHEN THE LIQUID LEVEL IS BELOW THE LOW POINT ON THE SCALE.
- 3) DO NOT OPERATE THE "NO LOAD", DE-ENERGIZED, TAP CHANGER WHEN THE TRANSFORMER IS ENERGIZED.
- 4) MAIN TANK, RADIATORS, DESIGNED FOR 14.7 PSI AND FULL VACUUM FILLING.
- 5) ALL WINDINGS ARE COPPER.
- 6) UNIT CONTAINS LUMINOL TRI OIL.
- 7) AT TIME OF MANUFACTURE, THIS TRANSFORMER CONTAINED NO DETECTABLE PCB'S.
- 8) THE LOADING CAPACITY OF THIS TRANSFORMER IS RATED FOR SITE ALTITUDES NOT EXCEEDING 1000 METERS.
- 9) 230 kV WINDINGS SHALL BE SUITABLE FOR 1.8 PU OVERVOLTAGE FOR 1 SECOND AND 1.15 PU CONTINUOUS OVERVOLTAGE.

APROXIMATE WEIGHT		LBS
CORE & WINDINGS (MAIN TRANSFORMER)		70990
CORE & WINDINGS (REACTOR)		4400
CORE & WINDINGS (SERIES)		14550
TANK & FITTINGS		42140
REMOVABLE RADIATORS		11110
LOAD TAP CHANGER & MOTOR DRIVE		2180
LIQUID IN TRANSFORMER		8658
LIQUID IN RADIATORS		443
LIQUID (LOAD TAP CHANGER)		345
TOTAL LIQUID		9446
TOTAL MASS WITH OIL		213162
TOTAL MASS WITHOUT OIL		145370
SHIPPING WEIGHT		115286

INSTRUCTION BOOK (SIEMENS) [CAN/CSA-C88-M90] T.040N.001092.03
 SERIAL No. T.040N.001092.03
 MONTH/YEAR BUILT 06/2011
 CUSTOMER ORDER No. 9000017832

SIEMENS TRANSFORMADORES S.A. DE C.V.
 MADE IN MEXICO

SIEMENS





SIEMENS

SIEMENS
TECHNICAL SPECIFICATIONS
AND NAME PLATE DATA
[Illegible technical details and nameplate data]



SIEMENS



SIEMENS

SIEMENS





Tag PS7 Piapoi
P O 9000017632



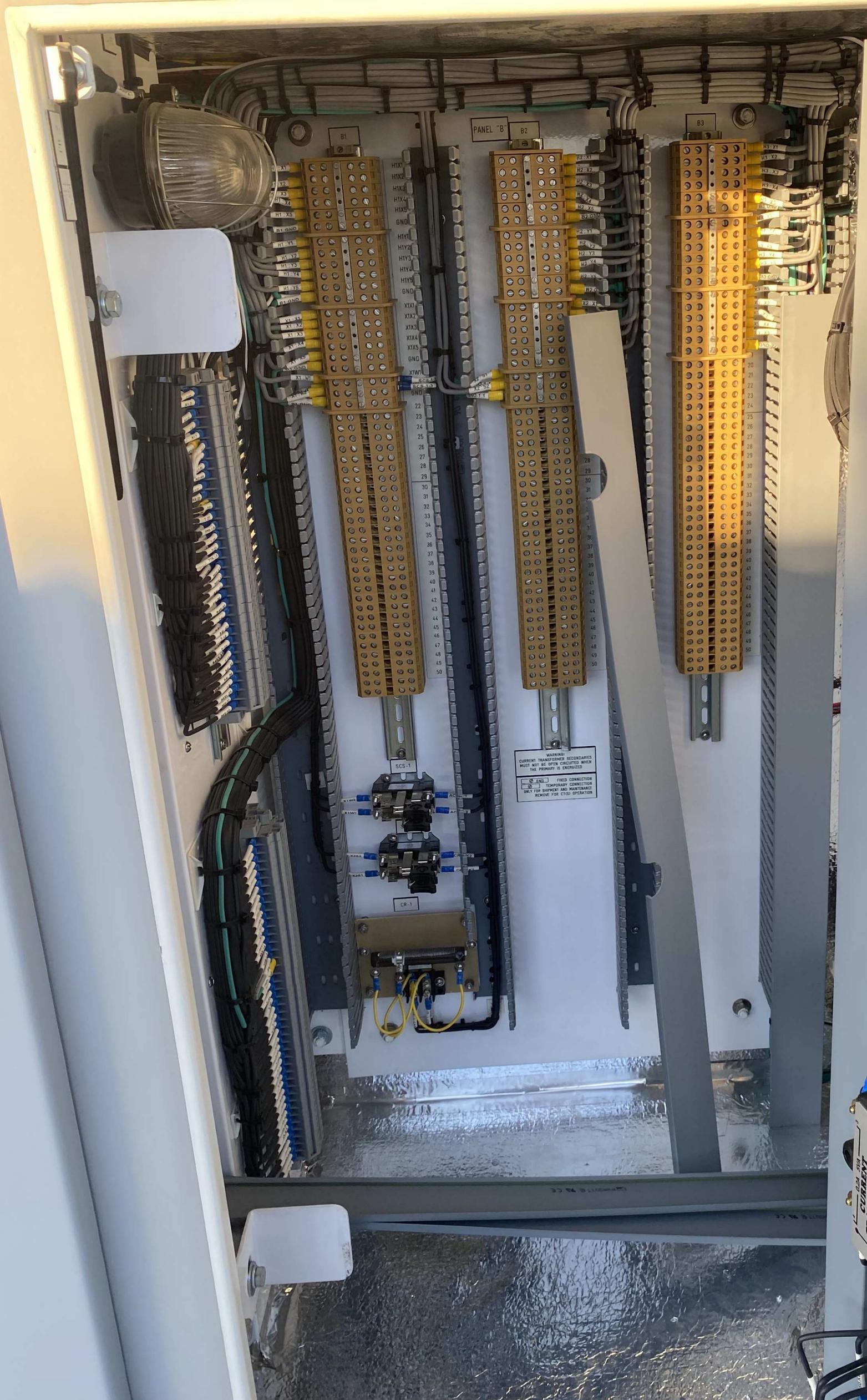






260-1





PANEL B

B1

B3

HIX1
HIX2
HIX3
HIX4
HIX5
GND
H1Y1
H1Y2
H1Y3
H1Y4
H1Y5
GND
XIX1
XIX2
XIX3
XIX4
XIX5
GND
X1W1

H2X1
H2X2
H2X3
H2X4
H2X5
GND
H2Y1
H2Y2
H2Y3
H2Y4
H2Y5
GND
X2W1

H3X1
H3X2
H3X3
H3X4
H3X5
GND
H3Y1
H3Y2
H3Y3
H3Y4
H3Y5
GND
X3W1

WARNING!
CURRENT TRANSFORMER SECONDARIES
MUST NOT BE OPEN CIRCUITED WHEN
THE PRIMARY IS ENERGIZED

FIELD CONNECTION
TEMPORARY CONNECTION
ONLY FOR SERVICE AND MAINTENANCE
REMOVE FOR CT/SY OPERATION

SCS-1

CR-1

US. PATENTS
5,315,527
5,581,173

Model: M-2001C-6SV
Software: D-0146V08.10.07
Ser. No. 61532

WARNING
CURRENT INPUT RATED FOR:
0.2A CONTINUOUS
0.4A FOR 2 HOURS
4.0A FOR 1 SECOND

P2-1 120VAC @ 8VA
P2-7,8,9 & 23 240VAC @ 6A
P2-2,4,5 & 6 0.2A @ 0.03VA
P2-19 120VAC @ 0.3A
P2-20,21,22 & 24 120VAC @ 3A
P2-9,10,11,12,13,14,15,17 & 19
12VDC @ 0.01A

CURRENT TRANSFORMER
M-1001A

100VAC
100VDC

0.01A
0.02A
0.05A
0.1A
0.2A
0.5A
1A
2A
5A
10A
20A
50A
100A

HA15-0.8-A-GCONDOR

Model: M-2001C-6SV
Software: D-0146V08.10.07
Ser. No. 61532

WARNING
CURRENT INPUT RATED FOR:
0.2A CONTINUOUS
0.4A FOR 2 HOURS
4.0A FOR 1 SECOND

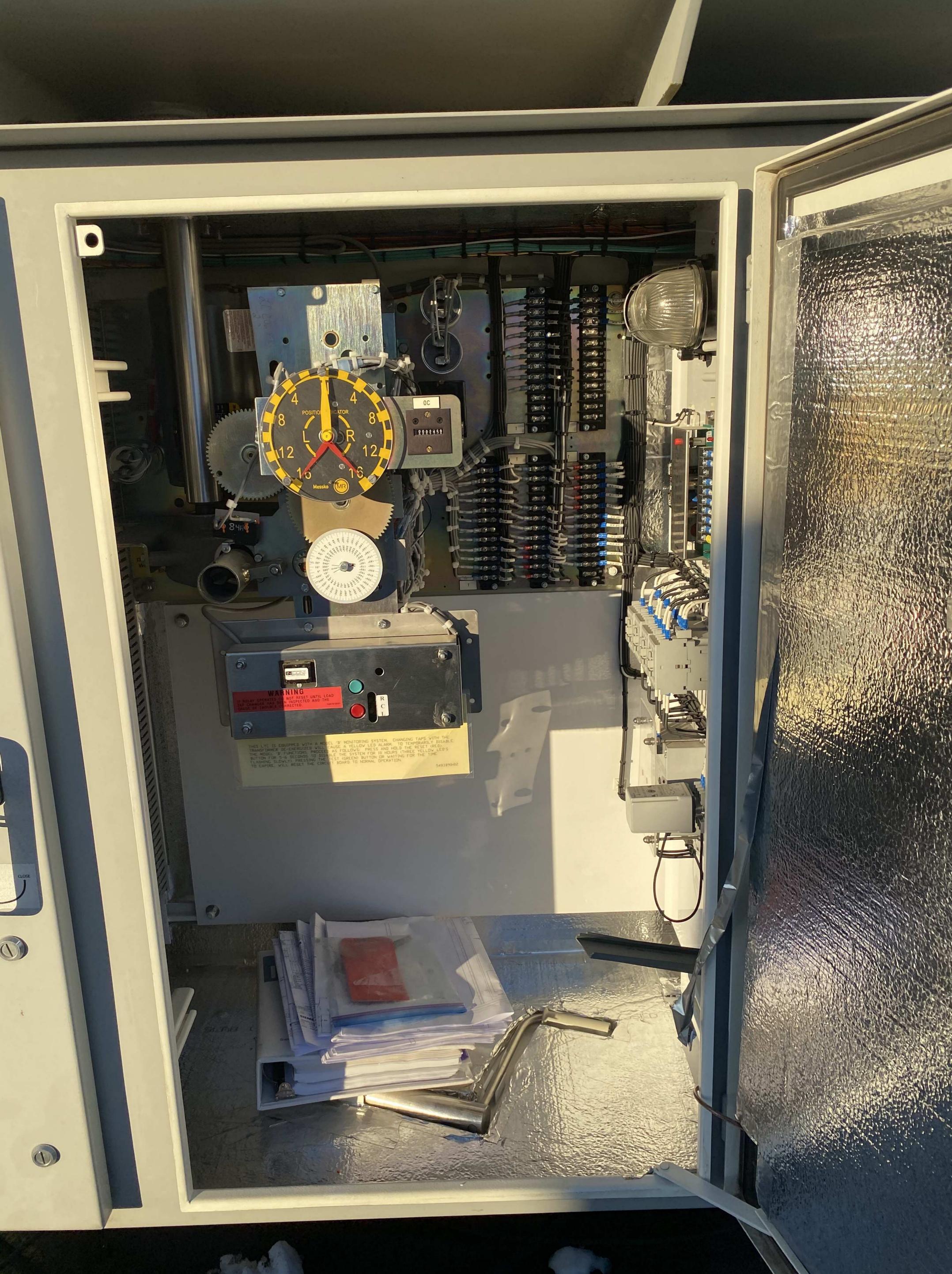
P2-1 120VAC @ 8VA
P2-7,8,18 & 23 240VAC @ 6A
P2-2,4,5 & 6 0.2A @ 0.03VA
P2-19 120VAC @ 0.3A
P2-20,21,22 & 24 120VAC @ 3A
P2-9,10,11,12,13,14,15,17 & 18
12VDC @ 0.01A

0.2A 9VA
CURRENT TRANSFORMER
M-0169A

MODEL HA15-0 9-A+G
CONDOR
OUTPUT 12V15V @ 0.3A
INPUT 100-240VAC
250-280VA
0.25 2A
50/60 Hz

NICON
1250B-4
120 VAC
RELEASABLE POSITION MONITOR
ELECTRONIC CONTROLS
WILLIAMS ELECTRONIC CORP. MAINE 04972 USA

86RL1
86RL1
K1:1B
K1:1A
K1:1C
K1:1D
K1:1E
K1:1F
K1:1G
K1:1H
K1:1I
K1:1J
K1:1K
K1:1L
K1:1M
K1:1N
K1:1O
K1:1P
K1:1Q
K1:1R
K1:1S
K1:1T
K1:1U
K1:1V
K1:1W
K1:1X
K1:1Y
K1:1Z
K2:1
K2:2
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K2:86
K2:87
K2:88
K2:89
K2:90
K2:91
K2:92
K2:93
K2:94
K2:95
K2:96
K2:97
K2:98
K2:99
K2:100



POSITION INDICATOR
Messko

WARNING
DO NOT RESET UNTIL LOAD
HAS CHANGED AND THE
CAUSE OF TRIP IS CORRECTED.

THIS UNIT IS EQUIPPED WITH A MODEL 'B' MONITORING SYSTEM. CHANGING TAPS WITH THE
TRANSFORMER IS PROHIBITED. IT WILL CAUSE A YELLOW LED ALARM. TO TEMPORARILY DISABLE
THE MODEL 'B' FUNCTIONS, PROCEED AS FOLLOWS: PRESS AND HOLD THE RESET (RED)
BUTTON FOR 5-6 SECONDS TO DISABLE THE SYSTEM FOR 10 HOURS (THREE YELLOW LED'S
FLASHING SLOWLY). PRESSING THE TEST (GREEN) BUTTON OR WAITING FOR THE TIME
TO EXPIRE, WILL RESET THE CIRCUIT BOARD TO NORMAL OPERATION.

5403990-02

PANEL "E"

BREAKER CONTROL CIRCUIT BREAKER INERTAIRE 63PVI BREAKER HEATERS/LIGHTS BREAKER OUTLET



OUTLET
15 A 125 Vac 60 Hz



START SWITCH
FANS STAGE#1
MAN/OFF/AUTO



START SWITCH
FANS STAGE#2
MAN/OFF/AUTO



FANS SELECTOR
STAGE
#1 / #2
FIRST



HEATER ON
SWITCH 1 OFF



BREAKER
POWER SUPPLY













Shermco Industries®

One Line. One Company.®

Appendix C: Transformer & LTC Oil Analysis



OIL SAMPLE REPORT

CUSTOMER DATA

Customer: Shermco Canada - Regina Shop Order#: 5-6390-05 Equip ID 27-PIAPT-B0-T-1
2361 Industrial Drive Customer PO#: 20-S226-15-01 Location TCPL - Piapot
P.O. Box 995 Serial# T.040N.001092.03 Imp. (% Z) 7.09
Regina Received Date: 12/7/2020 Gallons 6809
SK S4P 3B2 Reported Date: 12/7/2020 Primary Voltage kV 230
Contact: TYSON HAHN Phase 3 Phase KVA: 33333
Phone: (306) 949-8131 EXT Tank Transformer Mfg. Siemens
Cell: (306) 535-3315 Breathing Sealed Fluid Mineral Oil
FAX: (306) 522-9181 E-Mail: thahn@shermco.ca Voltage Class >230kV

SAMPLE DATA

Table with 4 columns: Property, 11/27/2020, 11/27/2017, 11/26/2015. Rows include Date Sampled, Oil Temp (C), Hydrogen (H2), Methane (CH4), Ethane (C2H6), Ethylene (C2H4), Acetylene (C2H2), Carbon Monoxide (CO), Carbon Dioxide (CO2), Nitrogen (N2), Oxygen (O2), Tot Dissolved Gas, Tot Dissolved Combustible Gas, Equivalent TCG %, Moisture PPM, Interfacial Tension (dynes/cm), Acid Number (mg KH/g), Color Number (Relative), Visual Exam (Relative), Sediment Exam (Relative), Dielectric Breakdown (kV), Dielectric Breakdown 1 mm (kV mm-C), Dielectric Breakdown 2 mm (kV mm-C), Power Factor @ 25C (%), Power Factor @ 100C (%), Specific Gravity (Relative), Relative Saturation (%), Oxidation Inhibitor (wt. %).



Customer: Shermco Canada - Regina

Shop Order#: 5-6390-05

Equip ID 27-PIAPT-B0-T-1

Customer PO#: 20-S226-15-01

Serial# T.040N.001092.03

Location TCPL - Piapot

Results

N2 Diagnosis - Pad gas
Total Combustible Gas - OK, Continue routine operation
Relative Saturation - Can't calculate due to temp below 10C

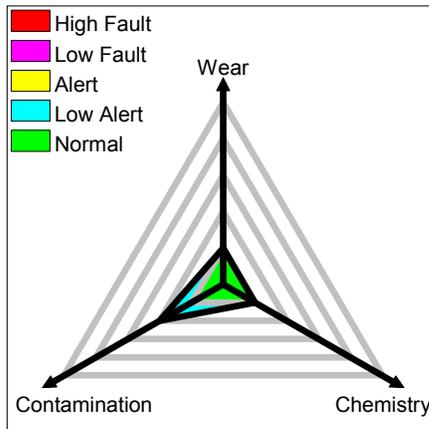
Recommendations

Sample data ok. Unit is in condition 1. No action required. Continue to monitor at normal sampling schedule. See attached particle count report.

Sample - PPM

Database: Shermco Database.rbm	Equipment: E1 - Transformers & LTC's
Area: A145 - Shermco Canada	Point: P99 - 27-PIAPT SN# T 04N 001092 03

Sample Date	11/27/2020
Sample #	85164
Unit Usage - hrs	
Oil Usage - hrs	
Oil Added - gus	



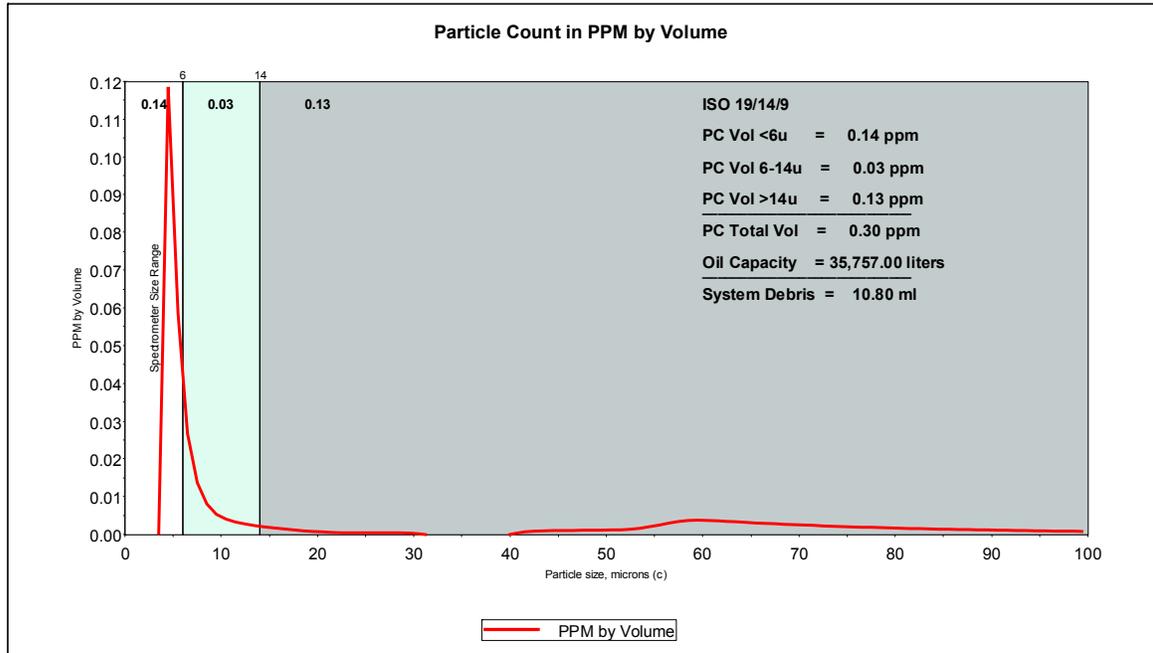
Shermco Industries
 33022 FM 2004
 Angleton, Texas
 (800)-219-9038
 G.Sellers@Shermco.com

Ref Oil	No Reference Oil
---------	------------------

Wear	0
Aluminum	1.82
Barium	.16
Boron	0.00
Cadmium	0.00
Calcium	.06
Chromium	0.00
Copper	0.00
Iron	0.0
Lead	0.00
Magnesium	.11
Molybdenum	0.00
Nickel	.60
Phosphorus	0.00
Potassium	.01
Silicon	.75
Silver	.16
Sodium	0.00
Tin	0.00
Titanium	1.25
Vanadium	0.00
Zinc	0.00
Manganese	1.09
Ferrous Idx	0.0
LCont Ferrous	
LCont NonFe	

Contamination	5
Contam Idx	
% Water	
LCont Droplet	
Cnts >4	2,685
Cnts >6	108
Cnts >14	5
Cnts >22	1
Cnts >38	1
Cnts >56	.6
Cnts >70	.2
ISO >4	19
ISO >6	14
ISO >14	9
NAS 1638	7
IR Oxidation	
IR Water	
Water K.Fish	

Chemistry	0
OilLife Idx	
Chemical Idx	0.0
Dielectric	
DV Visc 40C	
DV Visc %Chng	
IR Oxidation	
Visc 40C	
Visc 100C	
Visc Idx	
Total Acid	
Total Base	



Observations
Oil is in good condition
Oil is fit for further use

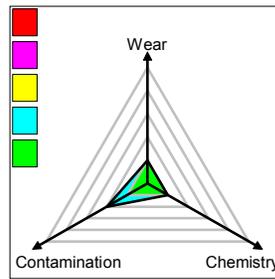
Actions
Continue normal sampling

Sample data ok. Particles within limits. No action required. Continue to monitor at normal sampling schedule.

Sample Trend - All Data

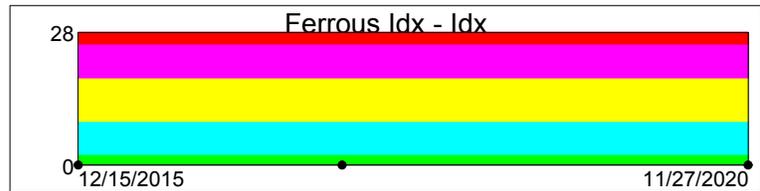
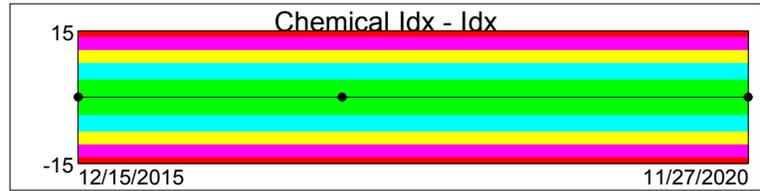
Database: Shermco Database.rbm	Equipment: E1 - Transformers & LTC's
Area: A145 - Shermco Canada	Point: P99 - 27-PIAPT SN# T 04N 001092 03

Ref Oil	No Reference Oil		
Sample Date	11/27/2020	11/27/2017	12/15/2015
Sample #	85164	47565	22551
Unit Usage - hrs			
Oil Usage - hrs			
Oil Added - gus			

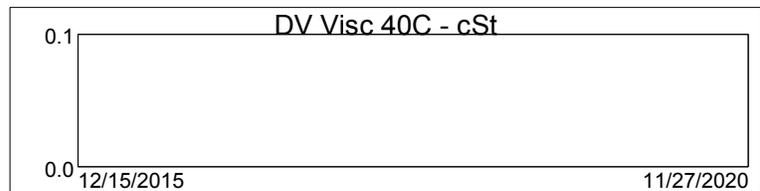
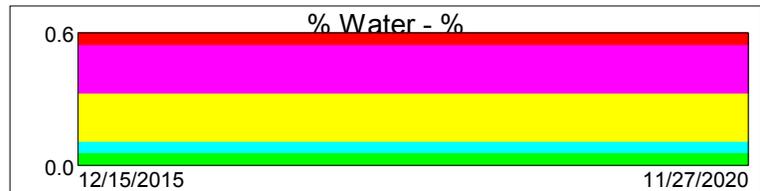


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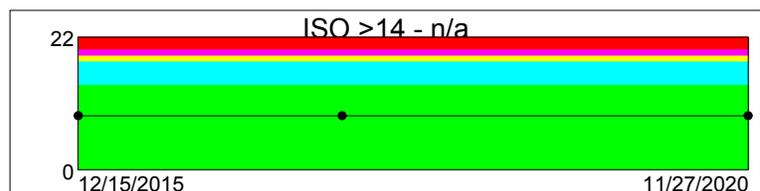
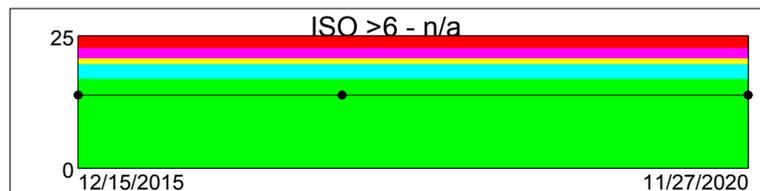
Wear	0	0	0
Aluminum - ppm	1.82		
Barium - ppm	.16		
Boron - ppm	0.00		
Cadmium - ppm	0.00		
Calcium - ppm	.06		
Chromium - ppm	0.00		
Copper - ppm	0.00		
Iron - ppm	0.0		
Lead - ppm	0.00		
Magnesium - ppm	.11		
Molybdenum - ppm	0.00		
Nickel - ppm	.60		
Phosphorus - ppm	0.00		
Potassium - ppm	.01		
Silicon - ppm	.75		
Silver - ppm	.16		
Sodium - ppm	0.00		
Tin - ppm	0.00		
Vanadium - ppm	0.00		
Zinc - ppm	0.00		
Manganese - ppm	1.09		
Ferrous Idx - Idx	0.0	0.0	0.0
LCont Ferrous - Idx			
LCont NonFe - Idx			
Titanium - ppm	1.25		



Contamination	5	0	9
Contam Idx - Idx			
% Water - %			
LCont Droplet - Idx			
Cnts >4 - pml	2,685	2,481	2,564
Cnts >6 - pml	108	89	87
Cnts >14 - pml	5	3	4
Cnts >22 - pml	1	1	1
Cnts >38 - pml	1	0	0
Cnts >56 - pml	.6	.7	.1
Cnts >70 - pml	.2	.3	.1
ISO >4 - n/a	19	18	19
ISO >6 - n/a	14	14	14
ISO >14 - n/a	9	9	9
NAS 1638 - Idx	7	7	6
IR Oxidation - au			
IR Water - au			
Water K.Fish - ppm			



Chemistry	0	0	0
OilLife Idx - Idx			
Chemical Idx - Idx	0.0	0.0	0.0
Dielectric - Idx			
DV Visc 40C - cSt			
DV Visc %Chng - %			
IR Oxidation - au			
Visc 40C - cSt			
Visc 100C - cSt			
Visc Idx - VI			
Total Acid - koh			
Total Base - koh			



Sample data ok. Particles within limits. No action required. Continue to monitor at normal sampling schedule.



OIL SAMPLE REPORT

CUSTOMER DATA

Customer: Shermco Canada - Regina Shop Order#: 5-6390-05 Equip ID 27-PIAPT-B0-T-1 LT
2361 Industrial Drive Customer PO#: 20-S226-15-01 Location TCPL - Piapot
P.O. Box 995 Serial# C020836 Imp. (% Z) N/A
Regina Received Date: 12/7/2020 Gallons 268
SK S4P 3B2 Reported Date: 12/7/2020 Primary Voltage kV 230
Contact: TYSON HAHN Phase 3 Phase KVA: N/A
Phone: (306) 949-8131 EXT Tank Lower Tap Change Mfg. Siemens
Cell: (306) 535-3315 Breathing Free Breather Fluid Mineral Oil
FAX: (306) 522-9181 E-Mail: thahn@shermco.ca Voltage Class >230kV

SAMPLE DATA

Table with 4 columns: Date Sampled (11/27/2020, 11/27/2017, 11/26/2015) and rows for various oil properties like Oil Temp, Hydrogen, Methane, Ethane, Ethylene, Acetylene, Carbon Monoxide, Carbon Dioxide, Nitrogen, Oxygen, Tot Dissolved Gas, etc.



Customer: Shermco Canada - Regina

Shop Order#: 5-6390-05

Equip ID 27-PIAPT-B0-T-1 LT

Customer PO#: 20-S226-15-01

Serial# C020836

Location TCPL - Piapot

Results

O2 Diagnosis - Leak to atmosphere, air vented
N2 Diagnosis - Pad gas and/or atmospheric air intrusion
Total Combustible gas - Ok. Continue normal operation

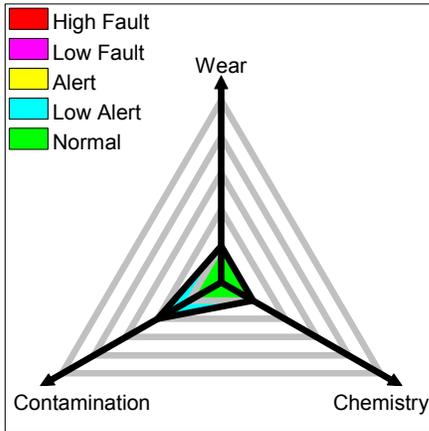
Recommendations

Sample data ok. LTC is in condition 1. No action required. Continue to monitor at normal sampling schedule. See attached dissolved metals and particle count report.

Sample - PPM

Database: Shermco Database.rbm	Equipment: E1 - Transformers & LTC's
Area: A145 - Shermco Canada	Point: P98 - 27-PIAPT LTC SN# C020836

Sample Date	11/27/2020
Sample #	85162
Unit Usage - hrs	
Oil Usage - hrs	
Oil Added - gus	



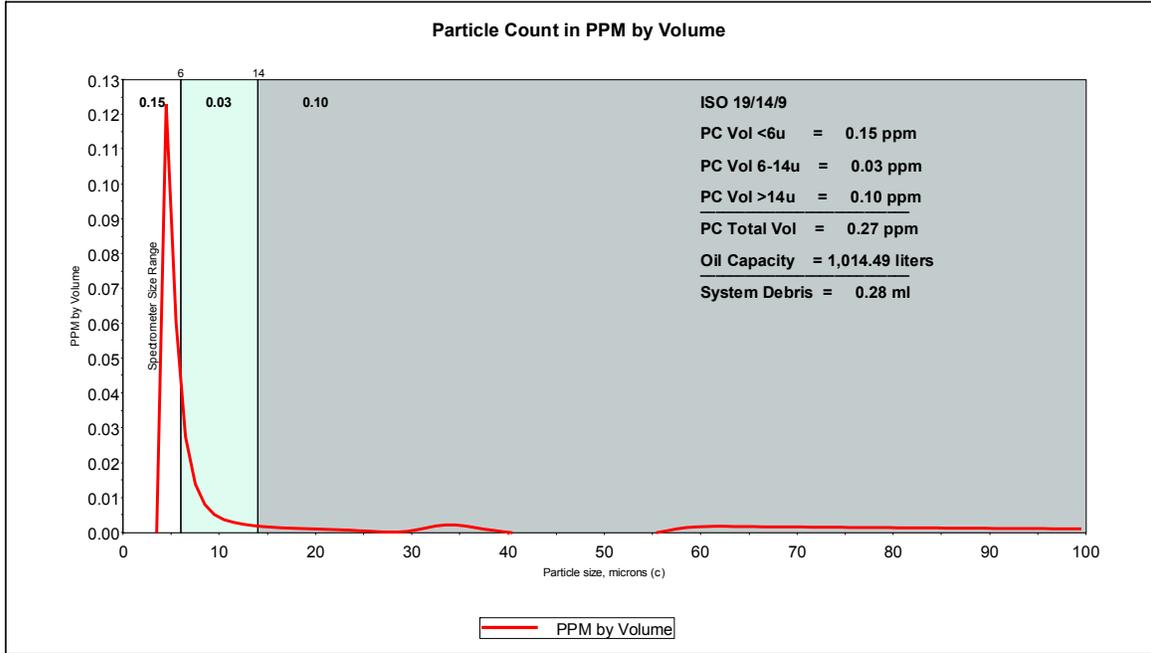
Shermco Industries
 33022 FM 2004
 Angleton, Texas
 (800)-219-9038
 G.Sellers@Shermco.com

Ref Oil	No Reference Oil
---------	------------------

Wear	0
Aluminum	2.05
Barium	.16
Boron	0.00
Cadmium	0.00
Calcium	.05
Chromium	.06
Copper	.01
Iron	0.0
Lead	0.00
Magnesium	.11
Molybdenum	0.00
Nickel	.45
Phosphorus	0.00
Potassium	.02
Silicon	.98
Silver	.17
Sodium	0.00
Tin	0.00
Titanium	1.24
Vanadium	0.00
Zinc	0.00
Manganese	1.12
Ferrous Idx	
LCont Ferrous	
LCont NonFe	

Contamination	5
Contam Idx	
% Water	
LCont Droplet	
Cnts >4	2,812
Cnts >6	118
Cnts >14	5
Cnts >22	1
Cnts >38	0
Cnts >56	.4
Cnts >70	.2
ISO >4	19
ISO >6	14
ISO >14	9
NAS 1638	7
IR Oxidation	
IR Water	
Water K.Fish	

Chemistry	0
OilLife Idx	
Chemical Idx	0.0
Dielectric	
DV Visc 40C	
DV Visc %Chng	
IR Oxidation	
Visc 40C	
Visc 100C	
Visc Idx	
Total Acid	
Total Base	



Observations
Oil is in good condition
Oil is fit for further use

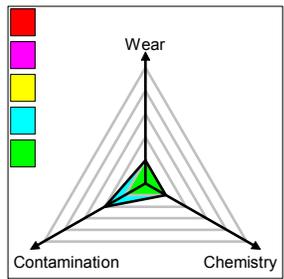
Sample data ok. Particles within limits. No action required. Continue to monitor at normal sampling schedule.

Actions
Continue normal sampling

Sample Trend - All Data

Database: Shermco Database.rbm	Equipment: E1 - Transformers & LTC's
Area: A145 - Shermco Canada	Point: P98 - 27-PIAPT LTC SN# C020836

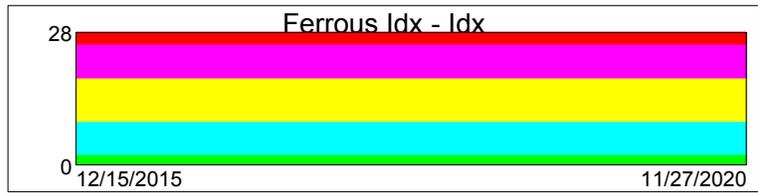
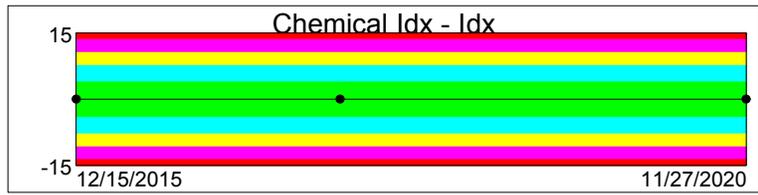
Ref Oil	No Reference Oil		
Sample Date	11/27/2020	11/27/2017	12/15/2015
Sample #	85162	47563	22548
Unit Usage - hrs			
Oil Usage - hrs			
Oil Added - gus			



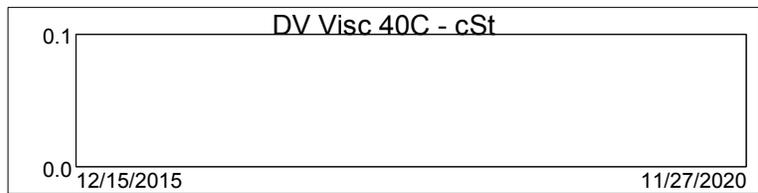
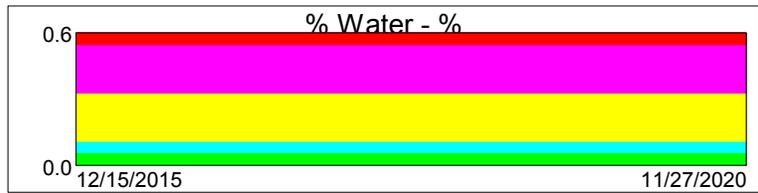
Si
Shermco Industries

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Angleton, Texas
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G.Sellers@Shermco.com

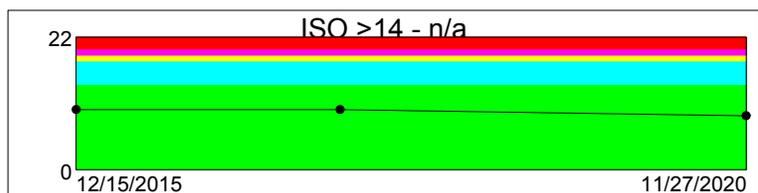
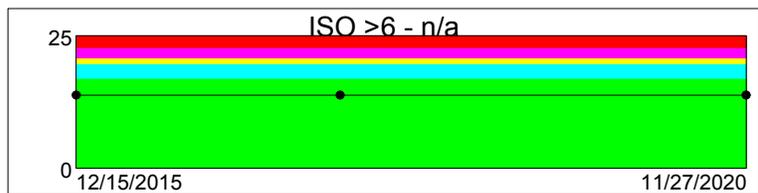
Wear	0	0	0
Aluminum - ppm	2.05	.43	0.00
Barium - ppm	.16	.01	.10
Boron - ppm	0.00	.05	.03
Cadmium - ppm	0.00	.05	.08
Calcium - ppm	.05	.01	.15
Chromium - ppm	.06	0.00	0.00
Copper - ppm	.01	.04	0.00
Iron - ppm	0.0	.1	0.0
Lead - ppm	0.00	.28	.89
Magnesium - ppm	.11	.01	.06
Molybdenum - ppm	0.00	0.00	0.00
Nickel - ppm	.45	0.00	0.00
Phosphorus - ppm	0.00	2.37	0.00
Potassium - ppm	.02	.03	1.76
Silicon - ppm	.98	.18	.85
Silver - ppm	.17	0.00	0.00
Sodium - ppm	0.00	.02	.89
Tin - ppm	0.00	0.00	0.00
Vanadium - ppm	0.00	0.00	0.00
Zinc - ppm	0.00	.15	.09
Manganese - ppm	1.12	0.00	.45
Ferrous Idx - Idx			
LCont Ferrous - Idx			
LCont NonFe - Idx			
Titanium - ppm	1.24	0.00	0.00



Contamination	5	1	9
Contam Idx - Idx			
% Water - %			
LCont Droplet - Idx			
Cnts >4 - pml	2,812	2,631	2,526
Cnts >6 - pml	118	105	100
Cnts >14 - pml	5	6	5
Cnts >22 - pml	1	1	1
Cnts >38 - pml	0	0	0
Cnts >56 - pml	.4	.5	.1
Cnts >70 - pml	.2	.1	.1
ISO >4 - n/a	19	19	19
ISO >6 - n/a	14	14	14
ISO >14 - n/a	9	10	10
NAS 1638 - Idx	7	6	6
IR Oxidation - au			
IR Water - au			
Water K.Fish - ppm			



Chemistry	0	0	0
OilLife Idx - Idx			
Chemical Idx - Idx	0.0	0.0	0.0
Dielectric - Idx			
DV Visc 40C - cSt			
DV Visc %Chng - %			
IR Oxidation - au			
Visc 40C - cSt			
Visc 100C - cSt			
Visc Idx - VI			
Total Acid - koh			
Total Base - koh			



Sample data ok. Particles within limits. No action required. Continue to monitor at normal sampling schedule.



Shermco Industries®

One Line. One Company.®

Appendix D: Test Sheets – Inspection & Test Plan



Table of Contents

Job #20-S226-15-02



PAGE _____

Customer TC Energy
USER TC Energy
--

Substation	Postion	Equipment Name	Page
Piapot	Piapot	02-006 - LOAD TAP-CHANGER - INSPECT	
Piapot	Piapot	02-007 - XFMR ALARMS	
Piapot	Piapot	02-008 - XFMR CAP AND DF	
Piapot	Piapot	02-009 - XFMR INSPECT	
Piapot	Piapot	02-010 - XFMR OVERALL TESTING	
Piapot	Piapot	02-011 - XFMR TTR	
Piapot	Piapot	02-012 - XFMR WDG RESISTANCE	



LOAD TAP-CHANGER INSPECTION & TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID A0-PIAPT-T-01

PAGE 7 OF 7
 JOB # 20-S226-15-02
 TESTED BY RS/SW/JS
DD / MM / YYYY
 DATE 26/11/2020
 TEMP. -2 °C HUMIDITY 55 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NUMBER T.040N.001092.03
 NUMBER OF TAPS 33 TAP CHANGER SIDE PRIMARY SECONDARY

DESCRIPTION	INSPECTED	N/A	COMMENTS
* LTC DATA COMPARES WITH DRAWINGS & SPECIFICATIONS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PHYSICAL & MECHANICAL CONDITION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LTC IS IN GOOD WORKING CONDITION
ANCHORAGE & ALIGNMENT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LTC TANK IN SECURE TO TRANFORMER
GROUNDING	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TEMPORARILY GROUNDED
CLEANLINESS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TRANSFORMER SURFACES WHERE NOTICABLE DIRT AND DUST WAS NOTICABLE
AUXILIARY DEVICE OPERATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
OPERATION OF MOTOR & DRIVE TRAIN	<input checked="" type="checkbox"/>	<input type="checkbox"/>	GOOD WORKING CONDITION
MOTOR CUTOFF AT MAX LOWER & MAX RAISE POSITION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LTC DOES NOT OPERATE PAST SET LIMITS
LIQUID LEVEL(S)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIQUID LEVEL IS OKAY
MOTOR COMPONENT LUBRICATION	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
HEATERS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	HEATERS IN CONTROL CABINET WORK
CONTACTS (INTERNAL INSPECTION)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
PHYSICAL & MECHANICAL CONDITION (INTERNAL INSPECTION)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
GASKETS (INTERNAL INSPECTION)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

* ACCEPTANCE TESTING ONLY

ELECTRICAL CONNECTIONS VERIFIED BY:

CONNECTION TIGHTNESS THERMOGRAPHIC SURVEY MEASURED RESISTANCE COUNTER READING: BEG. 2201
 END 2456

COMMENTS:
 DEFICIENCIES:

TEST EQUIPMENT USED _____



LIQUID FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID A0-PIAPT-T-01

PAGE 6 OF 7
 JOB # 20-S226-15-02
 TESTED BY RS/SW
DD / MM / YYYY
 DATE 24/11/2020
 TEMP. -2 °C HUMIDITY 55 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03

TRANSFORMER ALARMS

DESCRIPTION	TESTED	N/A	COMMENTS
RAPID PRESSURE RELAY	<input checked="" type="checkbox"/>	<input type="checkbox"/>	RAPID PRESSURE DEVICE TESTED BACK TO TERMINALS A2 (57-58)
WINDING TEMPERATURE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	WINDING TEMPERATURE DEVICE TESTED BACK TO TERMINAL BLOCK A1
LIQUID TEMPERATURE (MAIN TANK)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIQUID TEMPERATURE DEVICE TESTED BACK TO TERMINAL BLOCK A1
LIQUID TEMPERATURE (LTC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LIQUID TEMPERATURE DEVICE TESTED BACK TO TERMINAL BLOCK A1
PRESSURE RELIEF DEVICE (MAIN TANK)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PRD OF MAIN TANK WORKS BACK TO TERMINAL A1 BUT THE TRIPPING LATCH ON THE DEVICE IS NOT IN WORKING CONDITION. (WILL NOT LATCH)
PRESSURE RELIEF DEVICE (LTC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PRD OF LTC IN GOOD WORKING CONDITION (FLAG OF PRD IS BROKEN). REPLACE FLAG
GAS ACCUMULATION	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CURRENTLY NOT INSTALLED ON TRANSFORMER
OIL LEVEL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIL LEVEL DEVICE TESTED BACK TO TERMINAL A1

COMMENTS:

DEFICIENCIES:

TEST EQUIPMENT USED _____



3 PHASE LIQUID-FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID _____

PAGE 5 OF 7
 JOB # 20-S226-15-02
 TESTED BY RS/SW/JS
 DD / MM / YYYY
 DATE 26/11/2020
 TEMP. -3 °C HUMIDITY 55 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03

WINDING TEMPERATURE _____ °C

DISSIPATION TCF _____

TRANSFORMER CAPACITANCE & DISSIPATION FACTOR TESTS

TEST #	MEASUREMENT	TEST MODE	CAPACITANCE (pF)	% DISSIPATION FACTOR	
1	$C_{HG} + C_{HL}$	GST GND			
2	C_{HG}	GST			
3	C_{HL}	UST			
4	CHECK (TEST 1 MINUS 2)	-		-	-
5	$C_{LG} + C_{HL}$	GST GND			
6	C_{LG}	GST			
7	C_{LH}	UST			
8	CHECK (TEST 5 MINUS 6)	-		-	-

BUSHING CAPACITANCE & DISSIPATION FACTOR TESTS

DESIGNATION	MANUFACTURER	TYPE	SERIAL #	C1 NAMEPLATE		C2 NAMEPLATE		C1 MEASURED		C2 MEASURED	
				%PF	CAP (pF)	%PF	CAP (pF)	%DF	CAP (pF)	%DF	CAP (pF)
H1											
H2											
H3											
H0											
X1											
X2											
X3											
X0											

COMMENTS: REFER TO DOBLE FILES FOR POWER FACTOR RESULTS

DEFICIENCIES:

TEST EQUIPMENT USED _____



3 PHASE LIQUID-FILLED TRANSFORMERS VISUAL & MECHANICAL INSPECTION



CUSTOMER TC Energy PAGE 1 OF 7
 USER TC Energy JOB # 20-S226-15-02
 ADDRESS _____ TESTED BY RS/SW/JS
 PLANT Piapot DD / MM / YYYY
 PLANT AREA Piapot DATE 24/11/2020
 EQUIPMENT ID A0-PIAPT-T-01 TEMP. -3 °C HUMIDITY 55 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03
 SPECIFICATION NO. 9000017832 KVA 20000 / / TYPE _____ CLASS ONAN/ONAF
 TEMPERATURE RISE 65 °C IMPEDANCE 7.099 % B.I.L. RATING 825 KV PRI. 110 KV SEC. / / KV TER. _____
 INSULATING FLUID TYPE Tri Luminol CAPACITY 9446 gal TOTAL WEIGHT 213162 lbs
 TANK TYPE SEALED WINDING MATERIAL _____ YEAR 2011
 PRIMARY VOLTAGE 230,000 / DELTA WYE RATED CURRENT 50 / / AMPERES
 SECONDARY VOLTAGE 6,900 / 3,987.7 DELTA WYE RATED CURRENT 1,673 / / AMPERES
 TERTIARY VOLTAGE / DELTA WYE RATED CURRENT / / AMPERES
 TAP SETTING 3 230,000 VOLTS # FANS _____ TAP CHANGER SIDE: PRIMARY SECONDARY SURGE ARRESTORS

DESCRIPTION	INSPECTED	N/A	COMMENTS
* XFMR DATA COMPARES WITH DRAWINGS & SPECIFICATIONS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TRANSFORMER NAMEPLATE VERIFIED TO MATCH NAMEPLATE IN DRAWINGS PACKAGE
PHYSICAL & MECHANICAL CONDITION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TRANSFORMER IS IN GOOD PHYSICAL AND MECHANICAL CONDITION
LEAKS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NO VISIBLE LEAKS FOUND ON TRANSFORMER
BREATHERS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MINOR LEAK
ANCHORAGE & ALIGNMENT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TRANSFORMER IS IN A GOOD SECURE ENVIRONMENT
GROUNDING	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TEMPORARILY GROUNDED.
PCB CONTENT LABELLING	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
BUSHINGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BUSHINGS ARE IN GOOD CONDITION
* ALARM, CONTROL & TRIP SETTINGS ARE AS SPECIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ALL TESTED. REFER TO DEFICIENCIES
OPERATION OF COOLING FANS / PUMPS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FANS ARE NOT IN WORKING CONDITION DUE TO A CONTROL VOLTAGE ISSUE
TANK & BUSHING LIQUID LEVEL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OIL LEVEL IS GOOD

* ACCEPTANCE TESTING ONLY

ELECTRICAL CONNECTIONS VERIFIED BY:

CONNECTION TIGHTNESS THERMOGRAPHIC SURVEY MEASURED RESISTANCE

GAUGES

LIQUID TEMPERATURE 0 °C MAX _____ °C GAUGE RESET
 WINDING TEMPERATURE 0 °C MAX _____ °C GAUGE RESET
 GAS PRESSURE _____

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED _____



3 PHASE LIQUID-FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER	TC Energy	PAGE	4	OF	7
USER	TC Energy	JOB #	20-S226-15-02		
ADDRESS		TESTED BY	SW / JS / RS		
PLANT	Piapot		DD / MM / YYYY		
PLANT AREA	Piapot	DATE	26/11/2020		
EQUIPMENT ID	A0-PIAPT-T-01	TEMP.	-3 °C	HUMIDITY	80 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03

INSULATION TESTS

MEG-OHMS
 MICRO-AMPS
 WINDING TEMPERATURE 0 °C
 INSULATION TCF 0.25

TIME (MIN)	PRIMARY TO SECONDARY + GROUND		SECONDARY TO PRIMARY + GROUND	
	5 KV		5 KV	
0.25	340	85	296	74
0.50	390	97.5	275	68.75
0.75	440	110	277	69.25
1.00	550	137.5	279	69.75
1.25	540	135	281	70.25
1.50	528	132	283	70.75
1.75	535	133.75	285	71.25
2.00	538	134.5	288	72
3.00	545	136.25	304	76
4.00	548	137	305	76.25
5.00	562	140.5	302	75.5
6.00	573	143.25	294	73.5
7.00	579	144.75	298	74.5
8.00	586	146.5	298	74.5
9.00	593	148.25	300	75
10.00	602	150.5	301	75.25
P.I.	1.095		1.079	

POLARIZATION INDEX = 10 MIN READING / 1 MIN READING

CORE GROUND-GROUND _____ MEG-OHMS @ 500V FOR 1 MIN
 CORE CLAMP-GROUND _____ MEG-OHMS @ 500V FOR 1 MIN
 CORE-CORE CLAMP _____ MEG-OHMS @ 500V FOR 1 MIN

COMMENTS: CORE GROUND: 2 TERRA-OHMS, SERIES XFMR GND: 2 TERRA OHMS, REACTOR CORE GND: 350 MEGAOHMS

DEFICIENCIES:

TEST EQUIPMENT USED RF 69



3 PHASE LIQUID-FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID A0-PIAPT-T-01

PAGE 2 OF 7
 JOB # 20-S226-15-02
 TESTED BY SW / JS / RS
 DD / MM / YYYY
 DATE 26/11/2020
 TEMP. -3 °C HUMIDITY 80 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03

PRIMARY - SECONDARY TURNS RATIO

TAP POSITION	PRIMARY VOLTAGE	SECONDARY VOLTAGE	CALCULATED RATIO	H 1 - H 2 X 0 - X 1		H 2 - H 3 X 0 - X 2		H 3 - H 1 X 0 - X 3	
				RATIO	EXCITATION (mA)	RATIO	EXCITATION (mA)	RATIO	EXCITATION (mA)
16L	230,000	6,210 /		128.7	0.1	128.74	0.1	128.1	0.2
15L	230,000	6,253 /		127.88	0.2	127.94	0.1	127.99	0.3
14L	230,000	6,296 /		126.94	0.1	126.97	0.1	127.04	0.2
13L	230,000	6,339 /		126.15	0.2	126.18	0.2	126.26	0.2
12L	230,000	6,383 /		125.23	0.1	125.23	0.1	125.33	0.2
11L	230,000	6,426 /		124.43	0.2	124.5	0.1	124.58	0.2
10L	230,000	6,469 /		123.57	0.1	123.59	0.1	123.67	0.2
9L	230,000	6,512 /		122.82	0.1	122.86	0.1	122.94	0.2
8L	230,000	6,555 /		121.94	0.1	121.95	0.1	122.04	0.2
7L	230,000	6,598 /		121.22	0.2	121.25	0.1	121.31	0.3
6L	230,000	6,641 /		120.26	0.1	120.36	0.1	120.45	0.2
5L	230,000	6,684 /		119.67	0.1	119.68	0.1	119.76	0.2
4L	230,000	6,728 /		118.81	0.1	118.82	0.1	118.89	0.2
3L	230,000	6,771 /		118.86	0.1	118.17	0.1	118.25	0.2
2L	230,000	6,814 /		117.32	0.1	117.34	0.1	117.4	0.2
1L	230,000	6,857 /		116.65	0.2	116.69	0.1	116.75	0.2
N	230,000	6,900 /		115.85	0.1	115.88	0.1	115.94	0.2
1R	230,000	6,943 /		115.22	0.1	115.23	0.2	115.31	0.2
2R	230,000	6,986 /		114.38	0.2	114.4	0.2	114.48	0.2
3R	230,000	7,029 /		113.81	0.2	113.86	0.1	113.91	0.2
4R	230,000	7,073 /		113.04	0.1	113.05	0.2	113.12	0.2
5R	230,000	7,116 /		112.43	0.1	112.45	0.1	112.51	0.2
6R	230,000	7,159 /		111.66	0.1	111.71	0.1	111.79	0.2
7R	230,000	7,202 /		111.1	0.2	111.12	0.2	111.21	0.2
8R	230,000	7,245 /		110.37	0.1	110.4	0.2	110.49	0.2
9R	230,000	7,288 /		109.8	0.1	109.84	0.1	109.9	0.3
10R	230,000	7,331 /		109.09	0.2	109.12	0.1	109.19	0.3
11R	230,000	7,374 /		108.55	0.2	108.57	0.2	108.67	0.2
12R	230,000	7,418 /		107.84	0.1	107.87	0.1	107.94	0.2
13R	230,000	7,461 /		107.31	0.2	107.32	0.2	107.43	0.2
14R	230,000	7,504 /		106.61	0.1	106.64	0.1	106.72	0.2
15R	230,000	7,547 /		106.07	0.2	106.1	0.2	106.19	0.2
16R	230,000	7,590 /		105.4	0.2	105.44	0.1	105.5	0.2

COMMENTS: SECONDARY OLTC RANGES FROM: 16L-N-16R
PRIMARY DETC RANGES FROM: 1-5

DEFICIENCIES:

TEST EQUIPMENT USED RF 23



3 PHASE LIQUID-FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID A0-PIAPT-T-01

PAGE _____ OF 7
 JOB # 20-S226-15-02
 TESTED BY SW / JS / RS
DD / MM / YYYY
 DATE 26/11/2020
 TEMP. -3 °C HUMIDITY 80 %

PRIMARY - SECONDARY TURNS RATIO

TAP POSITION	PRIMARY VOLTAGE	SECONDARY VOLTAGE	CALCULATED RATIO	H 1 - H 2 X 0 - X 1		H 2 - H 3 X 0 - X 2		H 3 - H 1 X 0 - X 3	
				RATIO	EXCITATION (mA)	RATIO	EXCITATION (mA)	RATIO	EXCITATION (mA)
N & 1	241,500	6,900 /		121.65	0.1	121.68	0.1	121.73	0.2
N & 2	235,750	6,900 /		118.71	0.1	118.74	0.1	118.81	0.2
N & 3	230,000	6,900 /		115.85	0.1	115.88	0.1	115.94	0.2
N & 4	224,250	6,900 /		112.91	0.1	112.95	0.1	113.01	0.2
N & 5	218,500	6,900 /		110.06	0.1	110.09	0.1	110.14	0.2



3 PHASE LIQUID-FILLED TRANSFORMERS ELECTRICAL TESTING



CUSTOMER TC Energy
 USER TC Energy
 ADDRESS _____
 PLANT Piapot
 PLANT AREA Piapot
 EQUIPMENT ID A0-PIAPT-T-01

PAGE 3 OF 7
 JOB # 20-S226-15-02
 TESTED BY RS/SW/JS
DD / MM / YYYY
 DATE 26/11/2020
 TEMP. -3 °C HUMIDITY 55 %

NAMEPLATE DATA

MANUFACTURER SIEMENS SERIAL NO. T.040N.001092.03

WINDING TEMPERATURE 0 °C RESISTANCE TCF 1.0853

PRIMARY WINDING RESISTANCE OHMS MILLI-OHMS

TAP POSITION	RESISTANCE								
	H 1	-	H 2	H 2	-	H 3	H 3	-	H 1
1	6.177		6.704	6.168		6.694	6.173		6.7
2	6.03		6.544	6.02		6.534	6.024		6.538
3	5.88		6.382	5.874		6.375	5.879		6.381
4	5.738		6.227	5.727		6.216	5.73		6.219
5	5.59		6.067	5.58		6.056	5.584		6.06

SECONDARY WINDING RESISTANCE OHMS MILLI-OHMS

TAP POSITION	RESISTANCE								
	X 0	-	X 1	X 0	-	X 2	X 0	-	X 3
16L	2.143		2.326	2.746		2.98	2.59		2.811
1L	2.587		2.808	2.66		2.887	2.627		2.851
N	2.517		2.732	2.645		2.871	2.613		2.836
1R	2.412		2.618	2.644		2.87	2.609		2.832
16R	2.154		2.338	2.696		2.926	2.647		2.873

COMMENTS:
 DEFICIENCIES:

TEST EQUIPMENT USED RF 40



Comment Summary

Job #:20-S226-15-02



PAGE _____

Customer TC Energy
USER TC Energy
-- _____

PLANT: Piapot Page : _____
 PLANT AREA: Piapot Test Date and Time: 11/26/2020
 Equipment: 02-008 - XFMR CAP AND DF

REFER TO DOBLE FILES FOR POWER FACTOR RESULTS

PLANT: Piapot Page : _____
 PLANT AREA: Piapot Test Date and Time: 11/26/2020
 Equipment: 02-010 - XFMR OVERALL TESTING

CORE GROUND: 2 TERRA-OHMS, SERIES XFMR GND: 2 TERRA OHMS, REACTOR CORE GND: 350 MEGAOHMS

PLANT: Piapot Page : _____
 PLANT AREA: Piapot Test Date and Time: 11/26/2020
 Equipment: 02-011 - XFMR TTR

SECONDARY OLTC RANGES FROM: 16L-N-16R
 PRIMARY DETC RANGES FROM: 1-5



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Appendix E: Doble M4000 – Power Factor Test Data

T040N00109203_X2 (Siemens) piapot



Report Source TwoWindingTransformer

Session Test Date 11/26/2020 11:04:26 AM

Nameplate - Two-winding Transformer

Company	SIEMENS	Serial Number	T.040N.001092.03
Location	Regina Shop Yard	Special ID	
Division	RFS	Circuit Designation	
Manufacturer	Siemens	Configuration	D_Y
Year Manufactured	2011	Tank Type	Sealed
Mfr Location	MEXICO	Coolant	Other
Phases	Three	Class	ONAN/ONAF/ONAF
Oil Volume	7460 UG	BIL	1050 kV
Weight	115800 LB	VA Rating	20, 22.4, 26.7, 29.9, MVA
kV	230, 6.9		

Administration

Test Date	11/26/2020	Test Time:	11:04 AM	Weather	Indoors
Air Temperature	0.4°C	Apparatus Temperature	20°C	Humidity	39.951 %
Tester	S.Woodman	Work Order		Date Last Tested	11/24/2015
Verified		Test Set Type	M4100	Date Retested	
Verification Date		Set Top Serial #	61121028	Reason	
Last Sheet #		Test Set Model	M4100	Travel Time	
Purchase Order		Ins. Book #		Duration	
Copies		Sheet #		Crew Size	

Arrester Nameplate

Location	Serial #	Manufacturer	Overall Catalog	Unit Catalog	Type	Rated kV	Order
H1	S-96863	Ohio Brass	217752	215920-3011	VN	76	1
H1	S-96867	Ohio Brass	217752	215920-3011	VN	76	2
H2	S-96864	Ohio Brass	217752	215920-3011	VN	76	1
H2	S-96865	Ohio Brass	217752	215920-3011	VN	76	2
H3	S-96868	Ohio Brass	217752	215920-3011	VN	76	1
H3	S-96866	Ohio Brass	217752	215920-3011	VN	76	2

Bushing Nameplate

Designation	Serial #	Manufacturer	Type	C1 %PF	C1 Cap	C2 %PF	C2 Cap	Rated kV	Amps
H1	1ZUA 1000024432	ABB (ASEA-Brown Boveri)	O+C	0.35	515	0.32	6597	230	800
H2	1ZUA 1000024433	ABB (ASEA-Brown Boveri)	O+C	0.36	517	0.32	6572	230	800
H3	1ZUA 1000024431	ABB (ASEA-Brown Boveri)	O+C	0.36	505	0.32	6508	230	800

Bushing Additional Details -H1

Designation H1	Voltage Primary	Serial # 1ZUA 1000024432	
Catalog #	Amps 800 A	BIL 1050 kV	Tap
Class	Year 2011	Drawing	
Style	Other	S.O. Number	
Physical Dimensions			
Creep Distance *	Overall Length 56.25	Inner Seal Dia. *	Eff. Gnd Sleeve *
Total Weight 1272.00 Units	Recess Depth *	Outer Seal Dia. *	Slot Size *
Flange Dimensions			
To Bottom *	# Bolts *	Max. Diameters	Draw Lead
To Top *	Bolt Size *	Below Flange *	Tube ID *
	Circle Diameter *	Above Flange *	To Pin *

Bushing Additional Details -H2

Designation H2	Voltage Primary	Serial # 1ZUA 1000024433	
Catalog #	Amps 800 A	BIL 1050 kV	Tap
Class	Year 2011	Drawing	
Style	Other	S.O. Number	
Physical Dimensions			
Creep Distance *	Overall Length 56.25	Inner Seal Dia. *	Eff. Gnd Sleeve *
Total Weight 1272.00 Units	Recess Depth *	Outer Seal Dia. *	Slot Size *
Flange Dimensions			
To Bottom *	# Bolts *	Max. Diameters	Draw Lead
To Top *	Bolt Size *	Below Flange *	Tube ID *
	Circle Diameter *	Above Flange *	To Pin *

Bushing Additional Details -H3

Designation H3	Voltage Primary	Serial # 1ZUA 1000024431	
Catalog #	Amps 800 A	BIL 1050 kV	Tap
Class	Year 2011	Drawing	
Style	Other	S.O. Number	
Physical Dimensions			
Creep Distance *	Overall Length 56.25	Inner Seal Dia. *	Eff. Gnd Sleeve *
Total Weight 1272.00 Units	Recess Depth *	Outer Seal Dia. *	Slot Size *
Flange Dimensions			
To Bottom *	# Bolts *	Max. Diameters	Draw Lead
To Top *	Bolt Size *	Below Flange *	Tube ID *
	Circle Diameter *	Above Flange *	To Pin *

Overall Tests

	Insulation	Test kV	mA	Watts	PF*TCF [%]	Corr Fctr	Cap (pF)	FRANK™	Manual
1	CH+CHL	10.000	23.700	0.906	0.392	1	6286.535		
2	CH	10.000	10.612	0.609	0.565	1	2814.975	Investigate	
3	CHL (Measured)	10.000	13.114	0.325	0.247	1	3478.470	Good	
4	CHL	*	13.088	0.298	0.227	1	3471.560	Good	
5	CL+CHL	4.000	44.952	1.769	0.389	1	11924		
6	CL	4.000	31.831	1.423	0.443	1	8443.605	Good	
7	CHL (Measured)	4.000	13.118	0.323	0.245	1	3479.585	Good	
8	CHL	*	13.120	0.346	0.264	1	3480.395	Good	

Winding without Attached Bushing Calculation									
CH-C1	CH'		4.988	0.388	0.777	1	1322.935		
CL-C1	CL'		31.831	1.423	0.443	1	8443.605		

FRANK™ Message 2 (Investigate) - The power factor results are high for this apparatus. The measured power factor is high compared to the initial test. This may indicate a change in insulation health. Repeat the test to confirm, first checking all test connections and test set, including all test leads. Clean and dry surfaces of insulators to eliminate surface issues as a factor. Contact your supervisor or Doble.

For this apparatus, the low power factor limit is 0.1%, the degraded limit is 0.5%, and the high limit is 0.7%.

A temperature correction curve does not exist for this asset. Please upload this test to the Doble Database to help generate a library for analysis.

C1

ID	Serial #	Test kV	mA	Watts	Corr Fctr	PF*TCF [%]	NP %PF	Cap (pF)	NP Cap	FRANK™	Manual
H1	1ZUA 1000024432	10.000	1.883	0.071	0.943	0.357	0.35	499.491	515	Good	
H2	1ZUA 1000024433	10.000	1.895	0.074	0.943	0.365	0.36	502.726	517	Good	
H3	1ZUA 1000024431	10.000	1.847	0.076	0.943	0.386	0.36	489.823	505	Good	

C2

ID	Serial #	Test kV	mA	Watts	Corr Fctr	PF*TCF [%]	NP %PF	Cap (pF)	NP Cap	FRANK™	Manual
H1	1ZUA 1000024432	2.000	24.604	1.170	1	0.473		6526.120	6597	Good	
H2	1ZUA 1000024433	2.000	24.576	1.344	1	0.548		6518.265	6572	Investigate	
H3	1ZUA 1000024431	2.000	24.282	1.320	1	0.544		6440.480	6508	Investigate	

FRANK™ Message 2 (Investigate) - The C2 Power Factor has increased since initial test.

The C2 Power Factor is high compared to Nameplate.

3 (Investigate) - The C2 Power Factor has increased since initial test.

The C2 Power Factor is high compared to Nameplate.

Core Ground Test

Voltage	*	Resistance	*
---------	---	------------	---

Insulation Resistance

Core Ground Test				
Manufacturer	*			
Serial #	*			
Connections	Volts	T1 (Mohms)	T2 (Mohms)	PI
Hi to Lo/Ground	*	*	*	*
Hi to Ground Guard Lo	*	*	*	*
Lo to Hi/Ground	*	*	*	*
Lo to Ground Guard Hi	*	*	*	*
Hi to Lo Guard Ground	*	*	*	*
Core to Ground	*	*	*	*

Surge Arrester Tests

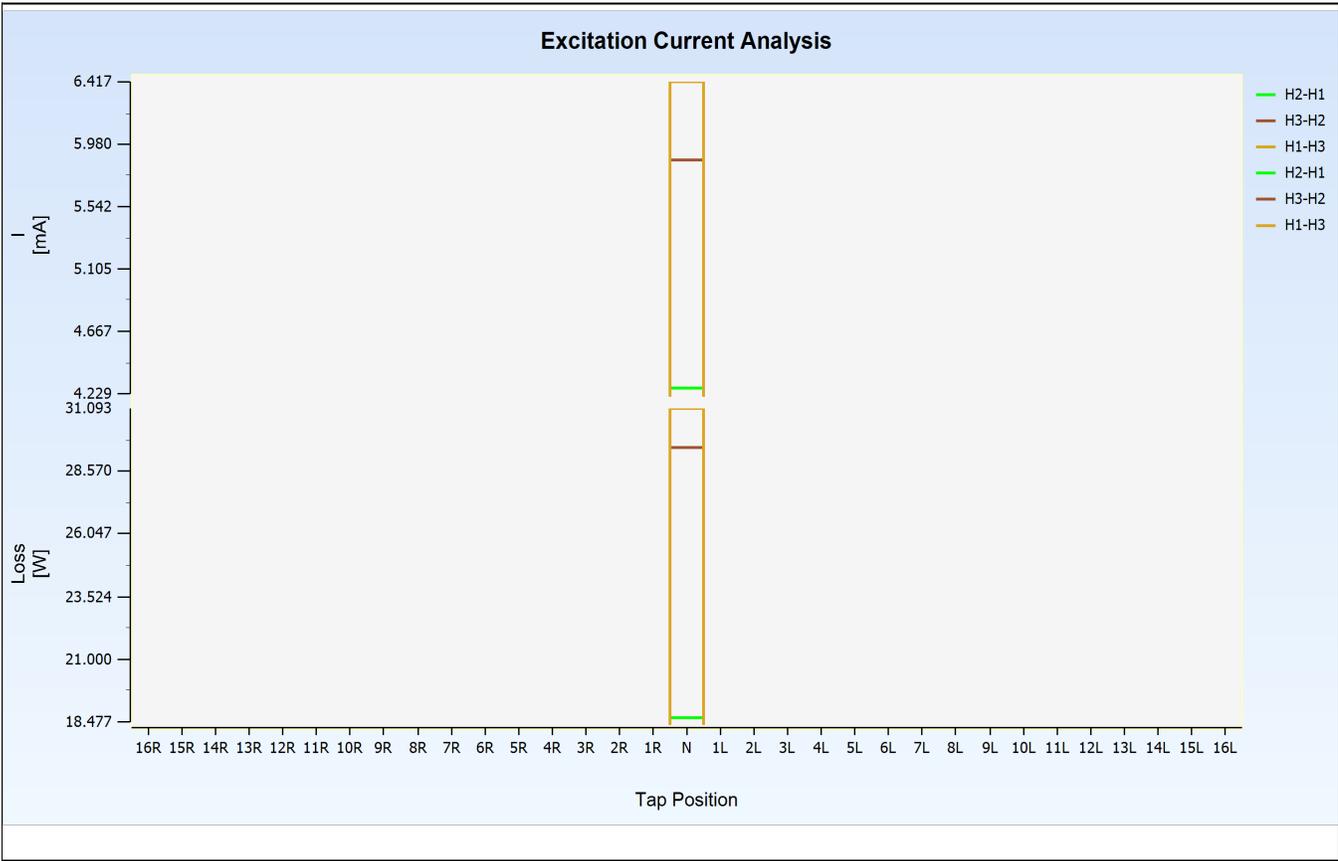
Location	Test Mode	Test kV	mA	Watts	FRANK™	Manual
H1	GND RB	10.000	0.253	0.032	Good	
H1	GND RB	10.000	0.247	0.035	Good	
H2	GND RB	10.000	0.259	0.034	Good	
H2	GND RB	10.000	0.252	0.036	Good	
H3	GND RB	10.000	0.257	0.034	Good	
H3	GND RB	10.000	0.244	0.033	Good	

Excitation Current & Losses Tests

	Manufacturer	Type	Steps	Boost %	Buck %	Position Found	Position Left	Oil Volume
DETC			5	*	*	1	1	*
DETC			5	*	*	2	2	*
DETC			5	*	*	3	3	*
DETC			5	*	*	4	4	*
DETC			5	*	*	5	5	*
OnLine	Reinhausen	RMV-II 1500	33	*	*			*

Winding : Tap	Test kV	H2 H1			H3 H2			H1 H3			FRANK™	Manual
		mA	Watts	X	mA	Watts	X	mA	Watts	X		
HV: 1 (Max V) LV: N	10	4.272	18.664	L	5.869	29.539	L	6.417	31.093	L	Good	
HV: 2 LV: N	10	4.467	19.626	L	6.127	30.950	L	6.538	31.995	L	Good	
HV: 3 LV: N	10	4.685	20.713	L	6.396	32.429	L	6.745	33.277	L	Good	
HV: 4 LV: N	10	4.926	21.943	L	6.684	34.048	L	6.992	34.788	L	Good	
HV: 5 (Min V) LV: N	10	5.219	23.402	L	6.986	35.755	L	7.275	36.447	L	Good	

Excitation Current Plot





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Appendix F: Sweep Frequency Response Analysis (SFRA) Data



Transformer Count: 1
Total Test Count: 9

1. Manufacturer: Siemens, Serial Number: T.040N.001092.03, Special ID:

TestDate: 26-Nov-20 2:36 PM, Trace Name: H2-H1_2020-11-26_14-36-42
TestDate: 26-Nov-20 2:44 PM, Trace Name: H2-H1_2020-11-26_14-44-00
TestDate: 26-Nov-20 2:55 PM, Trace Name: H1-H3_2020-11-26_14-55-39
TestDate: 26-Nov-20 3:00 PM, Trace Name: H1-H3_2020-11-26_15-00-08
TestDate: 26-Nov-20 3:13 PM, Trace Name: H3-H2_2020-11-26_15-13-19
TestDate: 26-Nov-20 3:18 PM, Trace Name: H3-H2_2020-11-26_15-18-17
TestDate: 26-Nov-20 3:33 PM, Trace Name: X1-X0_2020-11-26_15-33-58
TestDate: 26-Nov-20 3:40 PM, Trace Name: X3-X0_2020-11-26_15-40-58
TestDate: 26-Nov-20 3:45 PM, Trace Name: X2-X0_2020-11-26_15-45-09

Nameplate Details

1. Manufacturer: Siemens, Serial Number: T.040N.001092.03, Special ID:

TestTemplate: 3-Ph 2-Wind D-Y

Serial Number: T.040N.001092.03
Manufacturer: Siemens
Year of Manufacture: 2011
Special ID:
Current: 0
Phases: 3
Windings: 2
Type: DIST
HV: 230
LV1: 6.9
LV2: 0
Tertiary: 0
Impedance HV-LV1: 7.09
Impedance HV-LV2: 0
Impedance HV-Tertiary: 0
Impedance LV-Tertiary: 0

MVA Maximum: 37.33
MVA1: 20
MVA2: 22.4
MVA3: 26.66
Notes:
Template: 3-Ph 2-Wind D-Y
LTC Serial Number:
LTC Manufacturer: Siemens
LTC Year of Mfr: 2011
LTC Range: 16L-16R
LTC Notes: Secondary OLTC
DETC Serial Number:
DETC Manufacturer: Siemens
DETC Year of Mfr: 2011
DETC Range: 1-5
DETC Notes: Primary DETC

Instrument Details

1. Manufacturer: Siemens, Serial Number: T.040N.001092.03, Special ID:

TestDate: 26-Nov-20 2:36 PM, Trace Name: H2-H1_2020-11-26_14-36-42

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 2:44 PM, Trace Name: H2-H1_2020-11-26_14-44-00

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 2:55 PM, Trace Name: H1-H3_2020-11-26_14-55-39

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 3:00 PM, Trace Name: H1-H3_2020-11-26_15-00-08

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 3:13 PM, Trace Name: H3-H2_2020-11-26_15-13-19

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 3:18 PM, Trace Name: H3-H2_2020-11-26_15-18-17

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 3:33 PM, Trace Name: X1-X0_2020-11-26_15-33-58

Tested by: SW

Instrument serial number: 1465275C

Notes:

TestDate: 26-Nov-20 3:40 PM, Trace Name: X3-X0_2020-11-26_15-40-58

Tested by: SW

Instrument serial number: 1465275C

Notes:

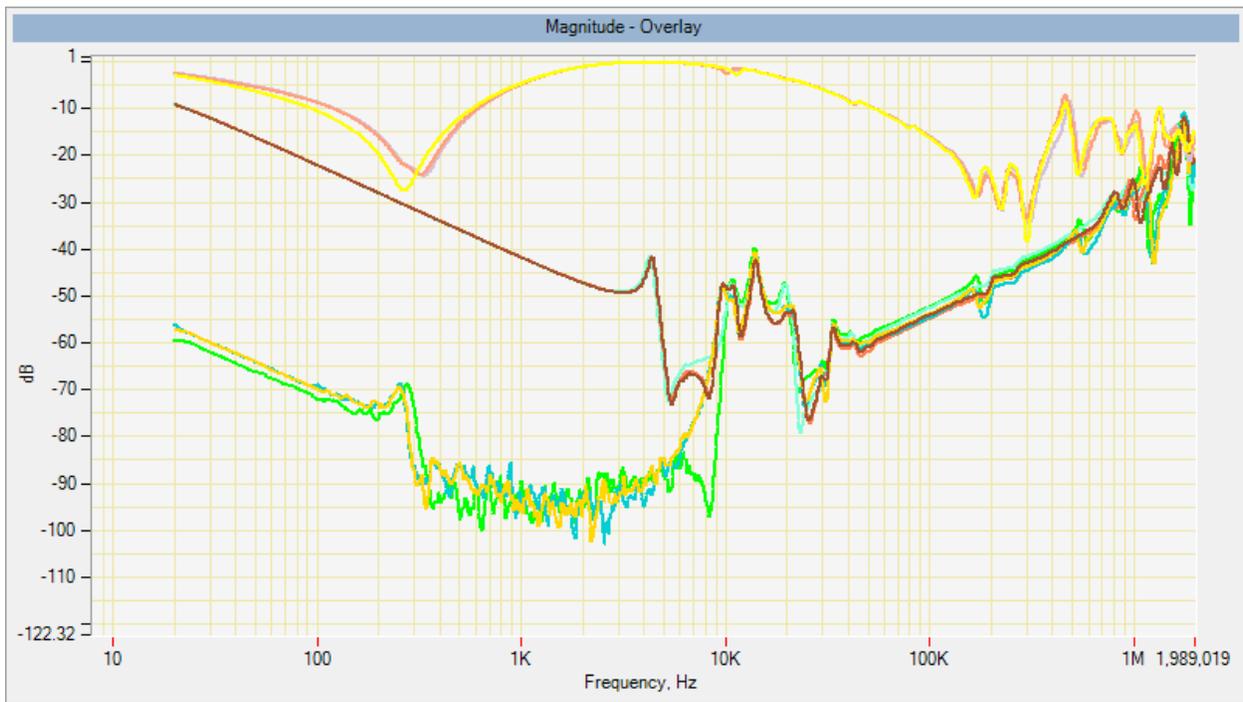
TestDate: 26-Nov-20 3:45 PM, Trace Name: X2-X0_2020-11-26_15-45-09

Tested by: SW

Instrument serial number: 1465275C

Notes:

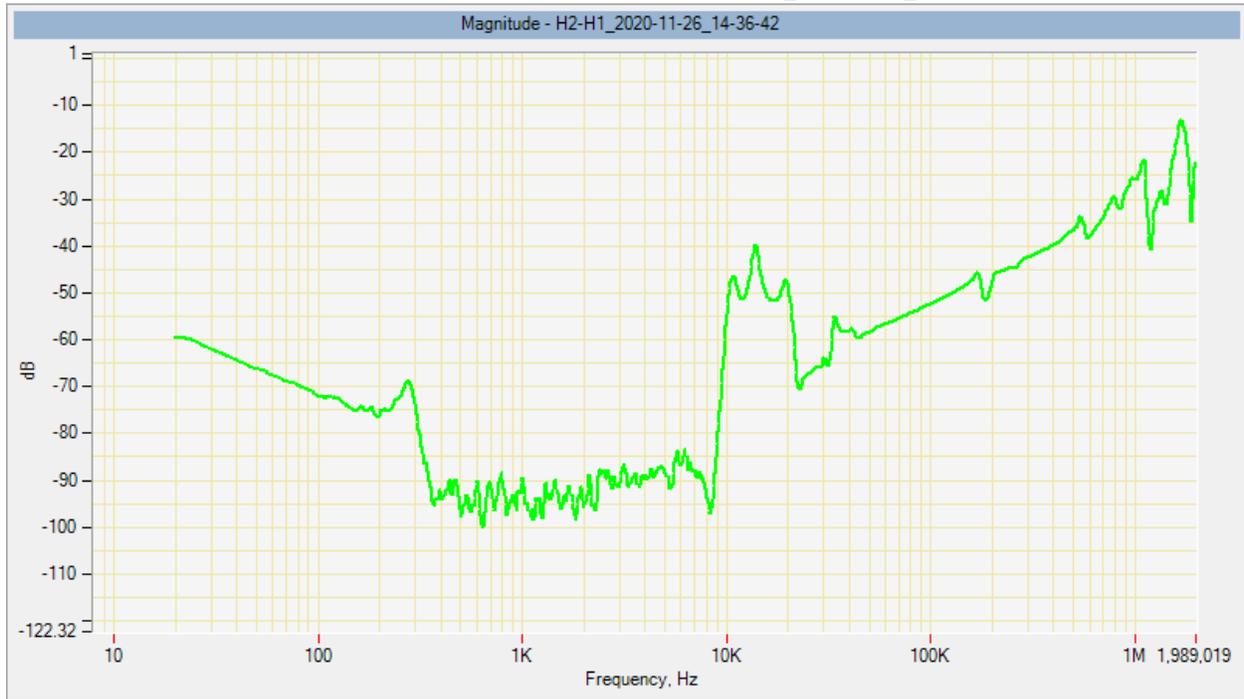
Sweep Frequency Response Analyzer Test Report



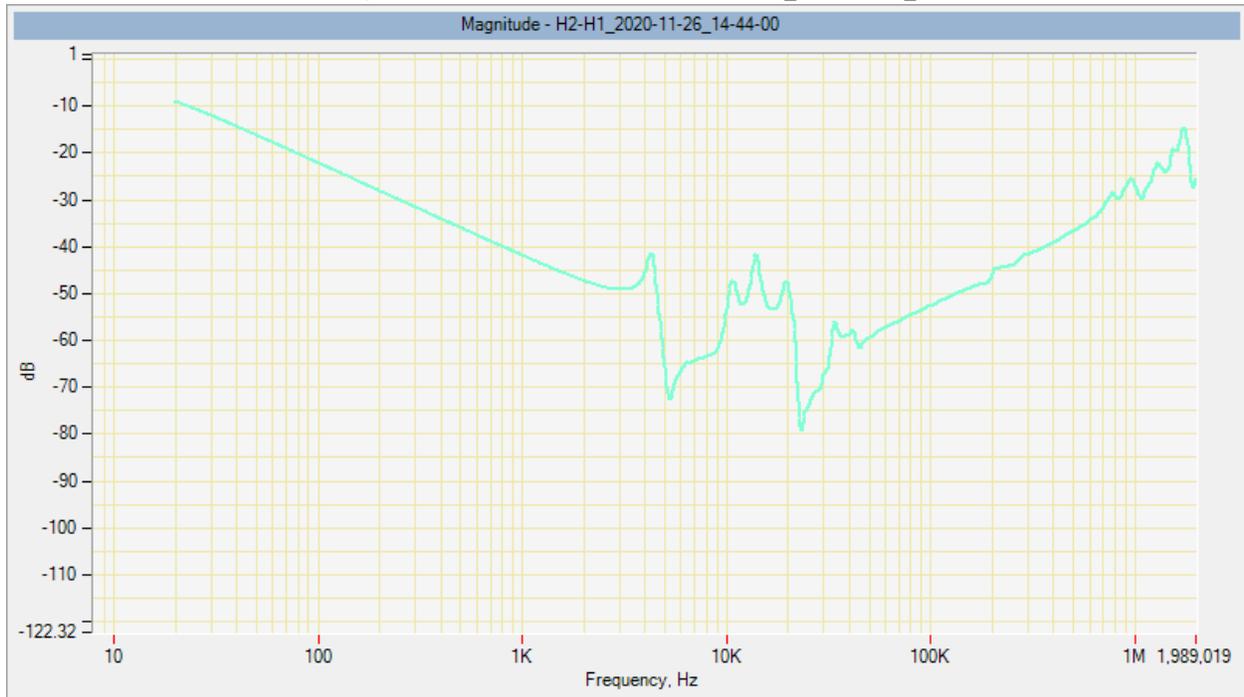
- H2-H1_2020-11-26_14-36-42 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 2:36:42 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- H2-H1_2020-11-26_14-44-00 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 2:44:00 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- H1-H3_2020-11-26_14-55-39 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 2:55:39 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- H1-H3_2020-11-26_15-00-08 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:00:08 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- H3-H2_2020-11-26_15-13-19 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:13:19 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- H3-H2_2020-11-26_15-18-17 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:18:17 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- X1-X0_2020-11-26_15-33-58 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:33:58 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- X3-X0_2020-11-26_15-40-58 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:40:58 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9
- X2-X0_2020-11-26_15-45-09 - Manufacturer: SiemensSerial Number: T.040N.001092.03Date: 26-Nov-20 3:45:09 PM
LTC: extreme raiseDETC: as found - make noteMVA Maximum: 37.33KV: 230/6.9

Sweep Frequency Response Analyzer Test Report

Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H2-H1_2020-11-26_14-36-42

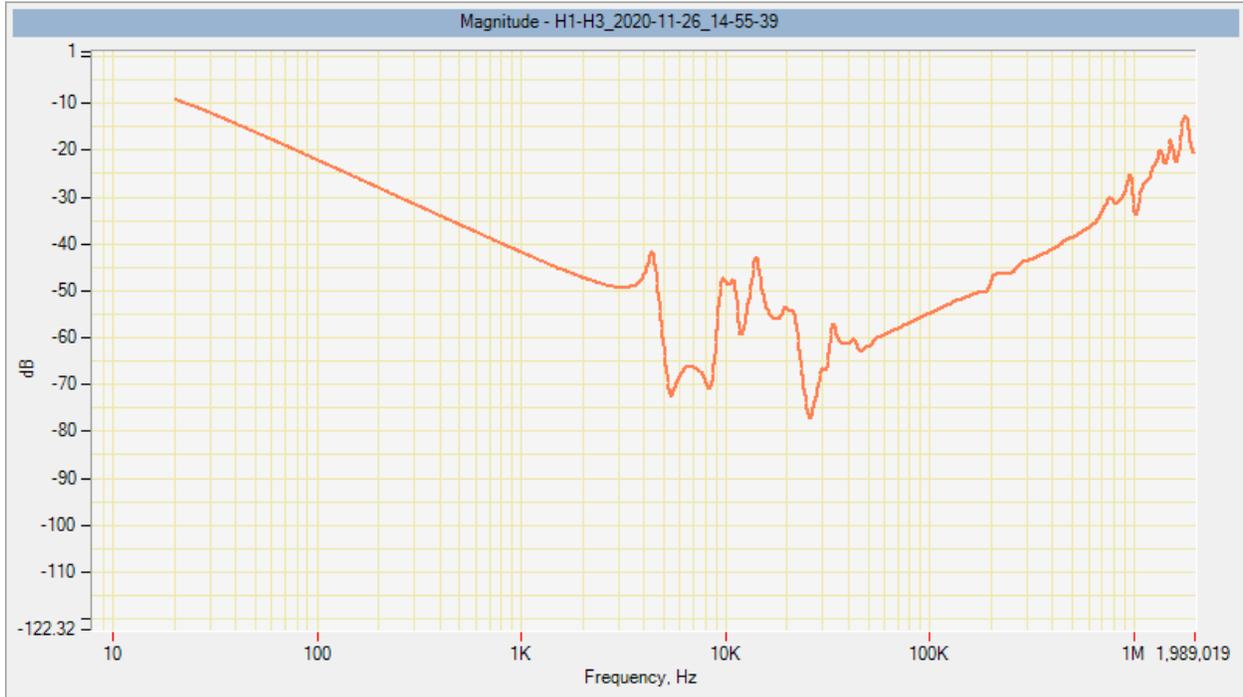


Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H2-H1_2020-11-26_14-44-00

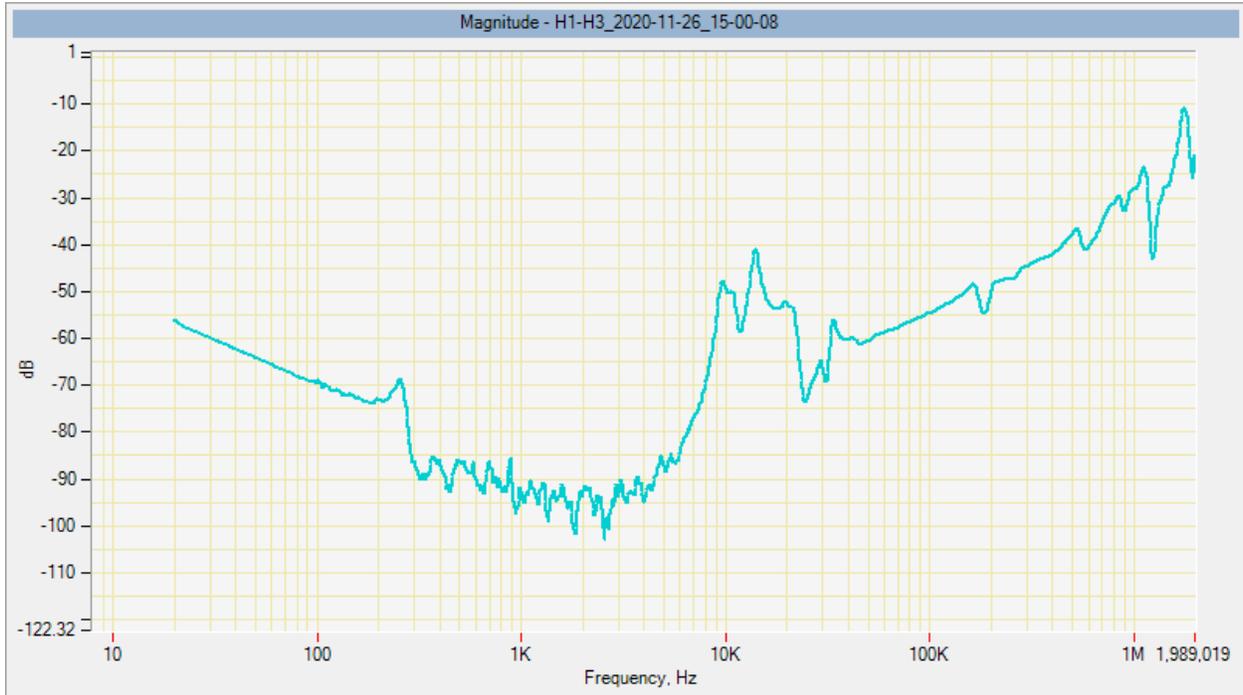


Sweep Frequency Response Analyzer Test Report

Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H1-H3_2020-11-26_14-55-39

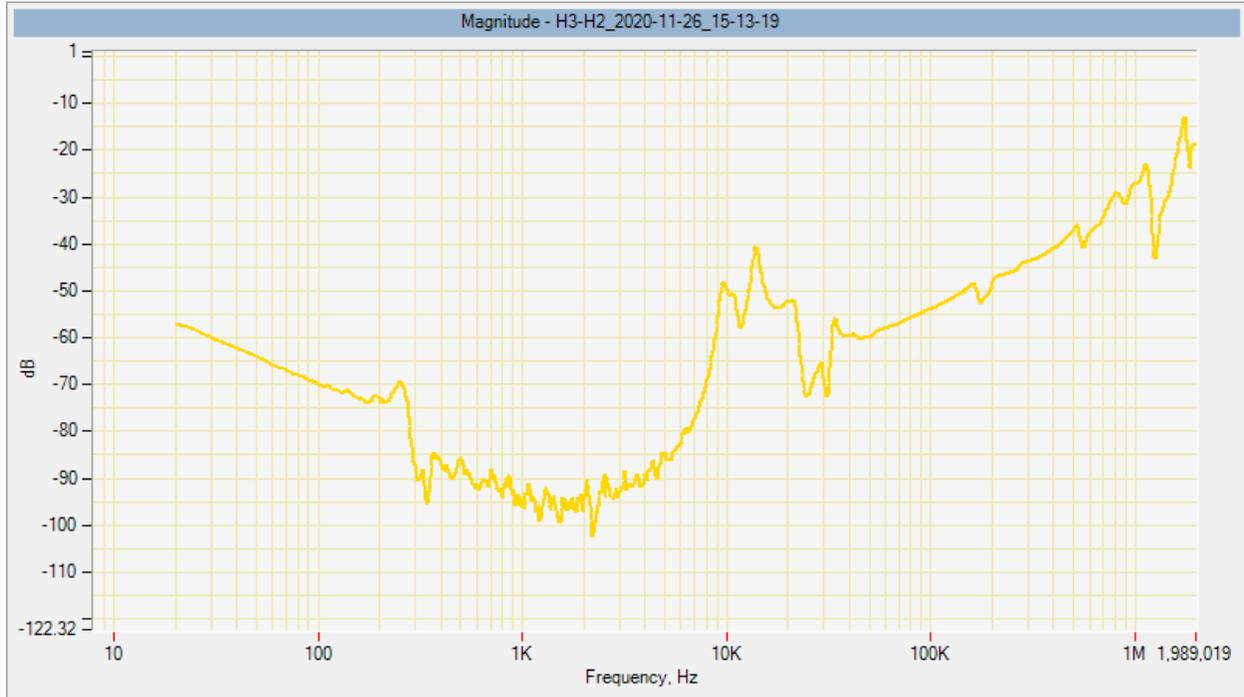


Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H1-H3_2020-11-26_15-00-08

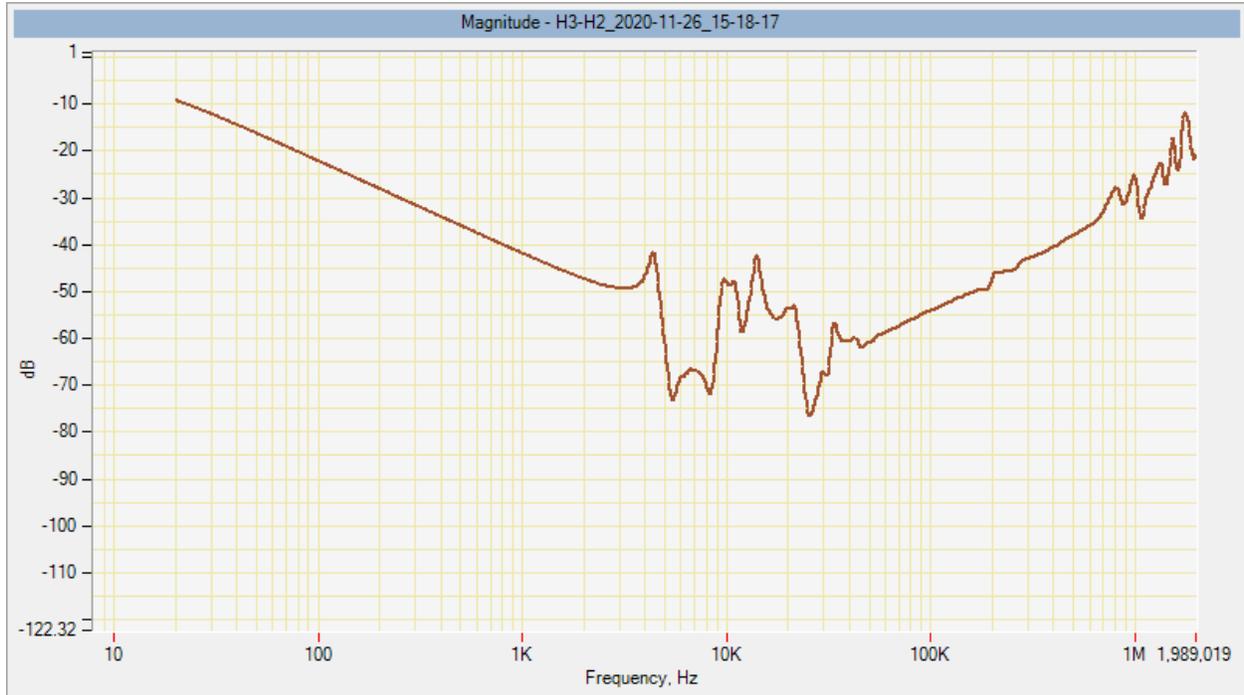


Sweep Frequency Response Analyzer Test Report

Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H3-H2_2020-11-26_15-13-19

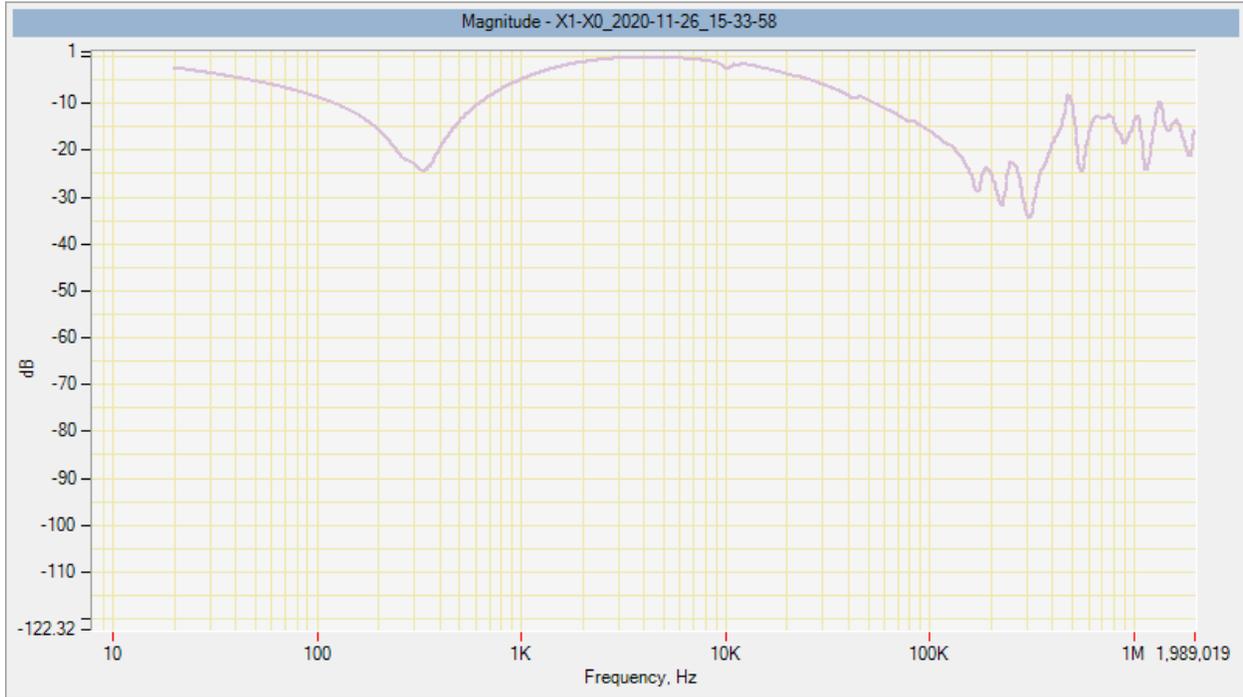


Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - H3-H2_2020-11-26_15-18-17

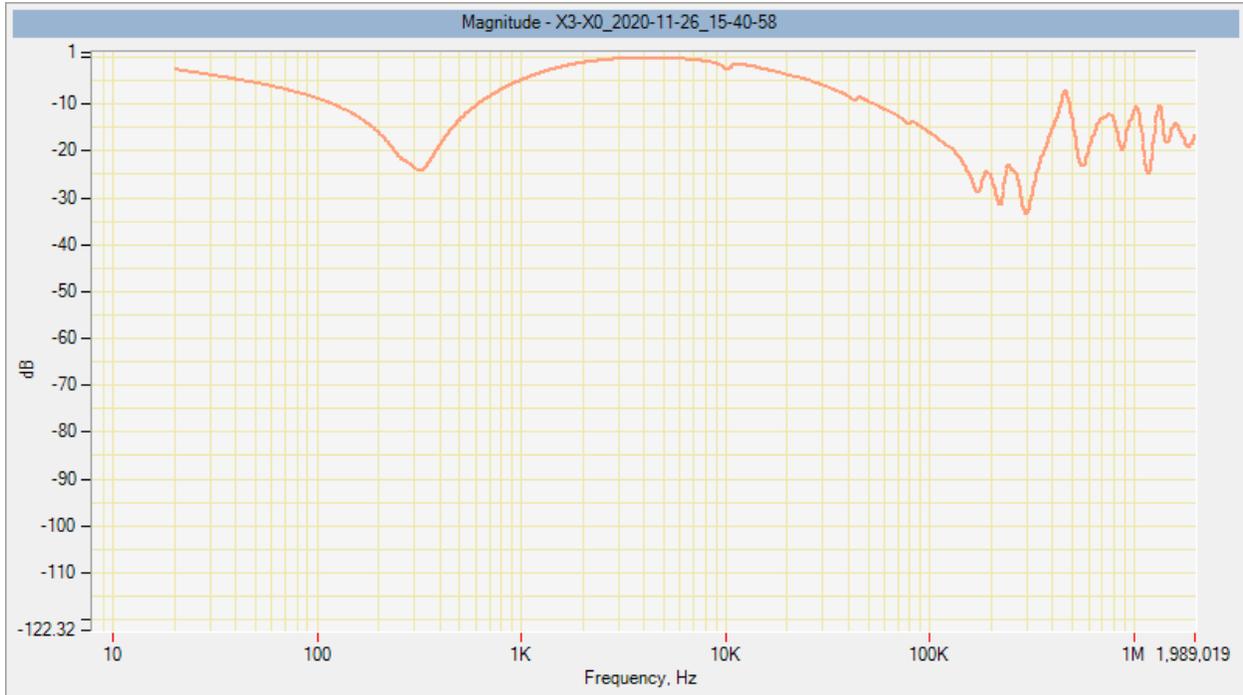


Sweep Frequency Response Analyzer Test Report

Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - X1-X0_2020-11-26_15-33-58

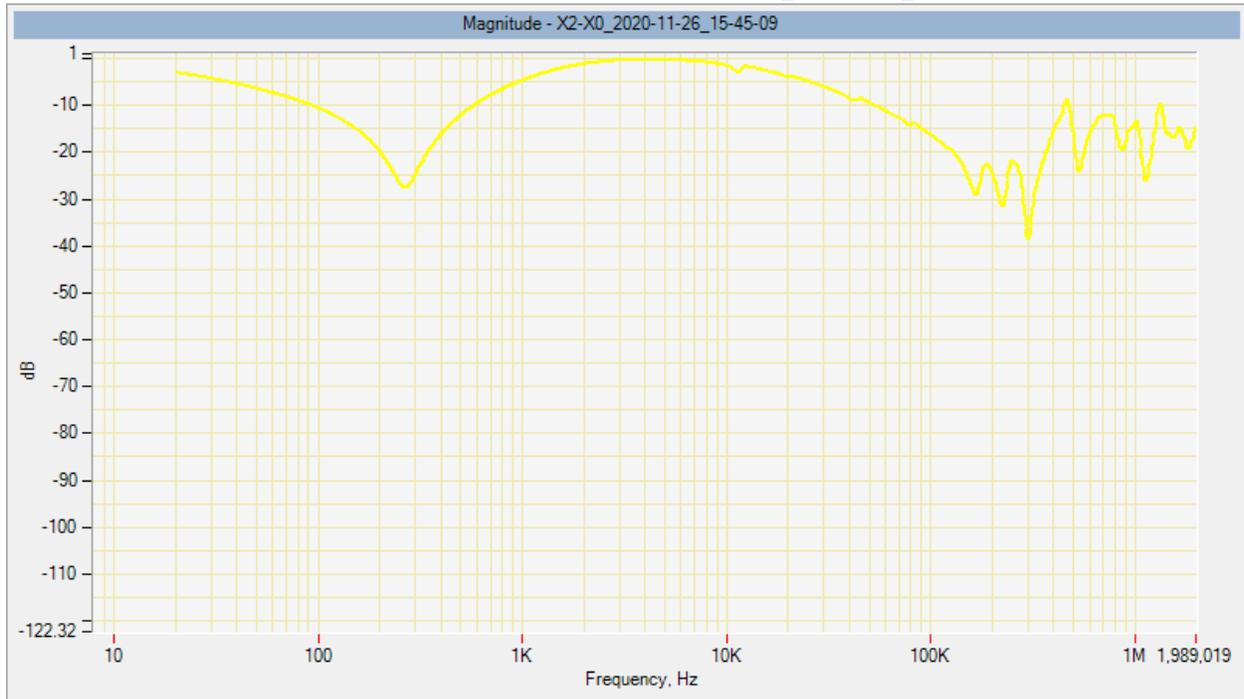


Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - X3-X0_2020-11-26_15-40-58

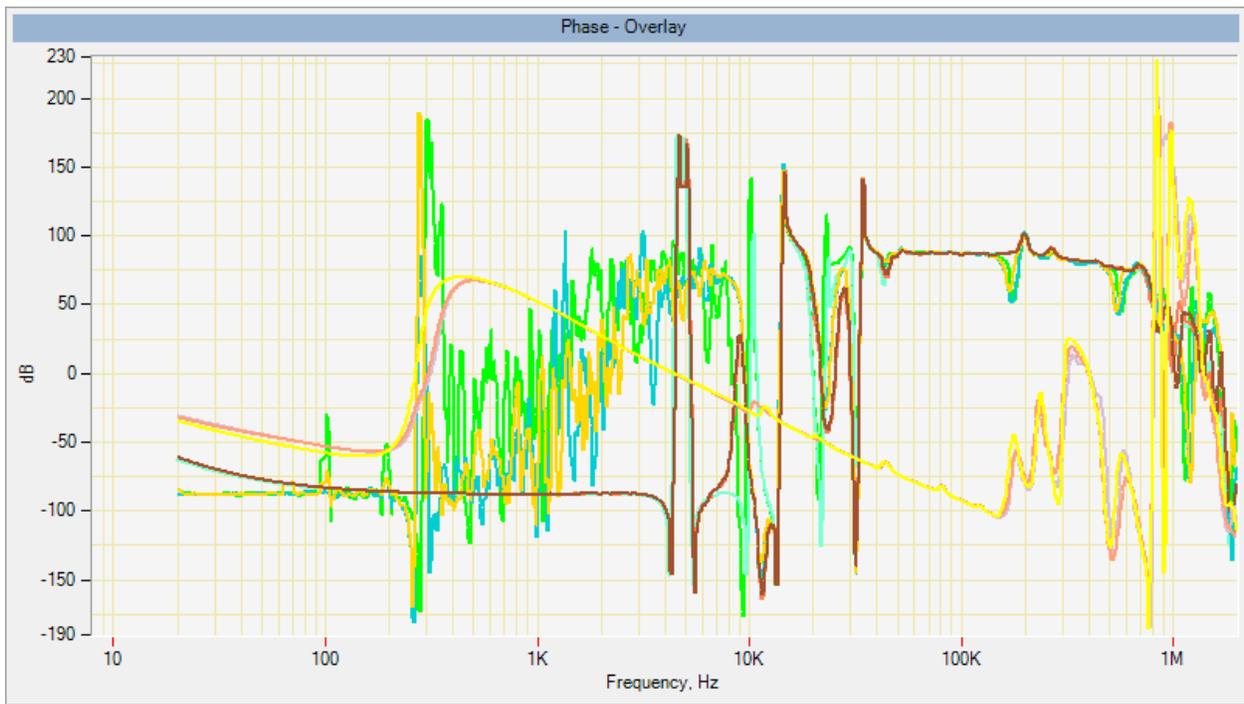


Sweep Frequency Response Analyzer Test Report

Transformer: Manufacturer: Siemens, Serial Number: T.040N.001092.03 - X2-X0_2020-11-26_15-45-09



Sweep Frequency Response Analyzer Test Report



Sweep Frequency Response Analyzer Test Report





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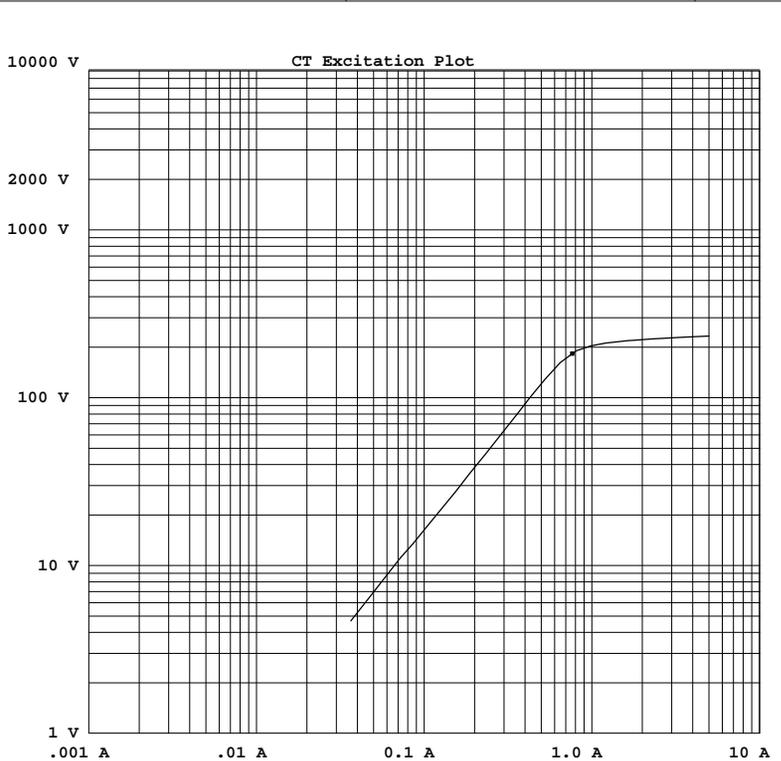
Appendix G: Current Transformer Test Data

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 98.300	Phase Angle:0.28°
Vkp[Volts]: 182.80	Vkp[Volts]: 152.04	Vkp[Volts]: 191.96	M-RATIO: 40.067	Ex I[Amps]: 0.419	In Phase
Ikp[Amps]: 0.7644	Ikp[Amps]: 0.6114	Ikp[Amps]: 0.8292	% ERROR: 0.1675	Winding Res: 180.39 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0366	4.68	127.87	17	0.9848	203.76	206.90
2	0.0468	6.40	136.75	18	1.2112	211.88	174.93
3	0.0558	8.00	143.37	19	1.6358	218.64	133.66
4	0.0718	11.04	153.76	20	1.8144	220.52	121.54
5	0.0858	13.48	157.11	21	2.2850	224.04	98.05
6	0.1026	16.80	163.74	22	2.8044	226.72	80.84
7	0.1256	21.52	171.34	23	3.4050	229.16	67.30
8	0.1540	27.52	178.70	24	4.1060	231.08	56.28
9	0.1888	35.76	189.41	25	5.0020	233.24	46.63
10	0.2360	47.16	199.83				
11	0.2870	60.28	210.03				
12	0.3544	78.76	222.23				
13	0.4320	101.48	234.91				
14	0.5268	129.04	244.95				
15	0.6476	161.88	249.97				
16	0.8062	190.24	235.97				

GRAPH POINTS

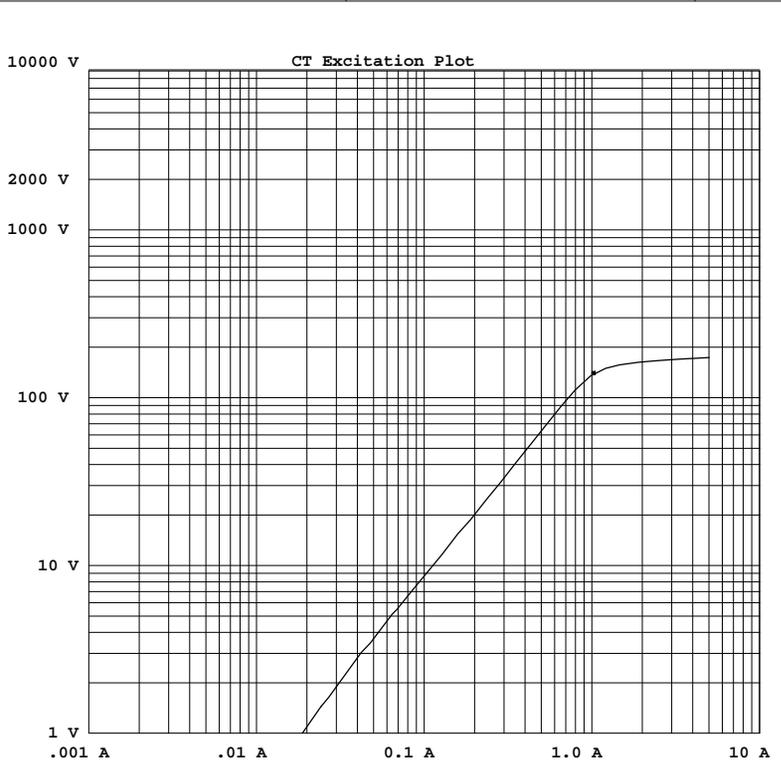
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	37.80	189.00
2	0.0020	0.00	0.00	13	0.4000	91.50	228.75
3	0.0040	0.10	25.00	14	0.5000	122.20	244.40
4	0.0050	0.10	20.00	15	0.8000	187.10	233.87
5	0.0080	0.20	25.00	16	1.0000	203.70	203.70
6	0.0100	0.30	30.00	17	2.0000	222.10	111.05
7	0.0200	1.40	70.00				
8	0.0400	4.70	117.50				
9	0.0500	6.30	126.00				
10	0.0800	11.70	146.25				
11	0.1000	15.80	158.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.200	Phase Angle:0.34°
Vkp[Volts]: 140.12	Vkp[Volts]: 112.92	Vkp[Volts]: 143.08	M-RATIO: 30.048	Ex I[Amps]: 0.684	In Phase
Ikp[Amps]: 1.0254	Ikp[Amps]: 0.8060	Ikp[Amps]: 1.1084	% ERROR: 0.1593	Winding Res: 153.65 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0188	1.00	53.19	17	0.4336	53.04	122.32
2	0.0242	1.44	59.50	18	0.5274	67.84	128.63
3	0.0270	1.64	60.74	19	0.6546	88.76	135.59
4	0.0298	1.88	63.09	20	0.7952	111.20	139.84
5	0.0422	3.04	72.04	21	0.9824	134.72	137.13
6	0.0476	3.44	72.27	22	1.2084	149.72	123.90
7	0.0644	5.12	79.50	23	1.4650	157.00	107.17
8	0.0684	5.44	79.53	24	1.8858	162.44	86.14
9	0.0890	7.52	84.49	25	2.2396	165.12	73.73
10	0.1084	9.52	87.82	26	2.7396	167.56	61.16
11	0.1280	11.64	90.94	27	3.3302	169.72	50.96
12	0.1588	15.44	97.23	28	4.0964	171.88	41.96
13	0.1888	18.68	98.94	29	5.0084	173.76	34.69
14	0.2378	25.04	105.30				
15	0.2890	31.76	109.90				
16	0.3524	41.00	116.35				

GRAPH POINTS

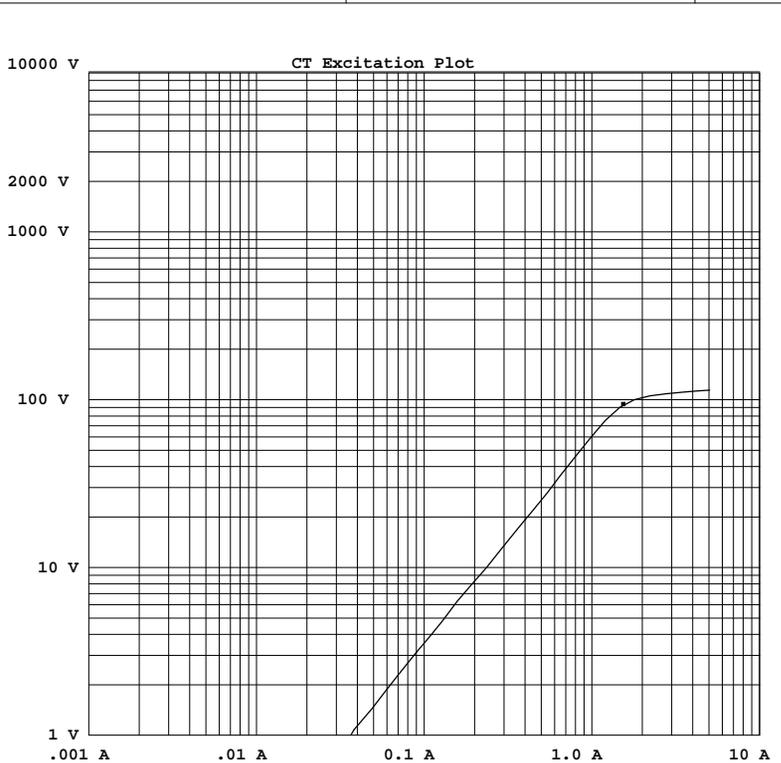
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	19.70	98.50
2	0.0020	0.00	0.00	13	0.4000	47.80	119.50
3	0.0040	0.10	25.00	14	0.5000	64.10	128.20
4	0.0050	0.10	20.00	15	0.8000	112.40	140.50
5	0.0080	0.20	25.00	16	1.0000	135.90	135.90
6	0.0100	0.20	20.00	17	2.0000	163.60	81.80
7	0.0200	0.60	30.00				
8	0.0400	2.10	52.50				
9	0.0500	2.90	58.00				
10	0.0800	5.90	73.75				
11	0.1000	8.00	80.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 45.100	Phase Angle:0.26°
Vkp[Volts]: 94.08	Vkp[Volts]: 76.40	Vkp[Volts]: 96.12	M-RATIO: 20.066	Ex I[Amps]: 0.783	In Phase
Ikp[Amps]: 1.5420	Ikp[Amps]: 1.2210	Ikp[Amps]: 1.6708	% ERROR: 0.3315	Winding Res: 144.17 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0192	0.40	20.83	17	0.5430	27.92	51.42
2	0.0238	0.56	23.53	18	0.6460	35.08	54.30
3	0.0320	0.80	25.00	19	0.8042	46.28	57.55
4	0.0382	1.08	28.27	20	0.9870	59.64	60.43
5	0.0488	1.44	29.51	21	1.2054	75.28	62.45
6	0.0590	1.84	31.19	22	1.4712	90.12	61.26
7	0.0698	2.28	32.66	23	1.7982	100.00	55.61
8	0.0898	3.12	34.74	24	2.2202	105.40	47.47
9	0.1080	3.88	35.93	25	2.7688	108.64	39.24
10	0.1292	4.84	37.46	26	3.4018	110.80	32.57
11	0.1572	6.28	39.95	27	4.1612	112.56	27.05
12	0.1946	8.04	41.32	28	5.0572	114.04	22.55
13	0.2340	9.92	42.39				
14	0.2874	12.84	44.68				
15	0.3662	17.32	47.30				
16	0.4456	21.88	49.10				

GRAPH POINTS

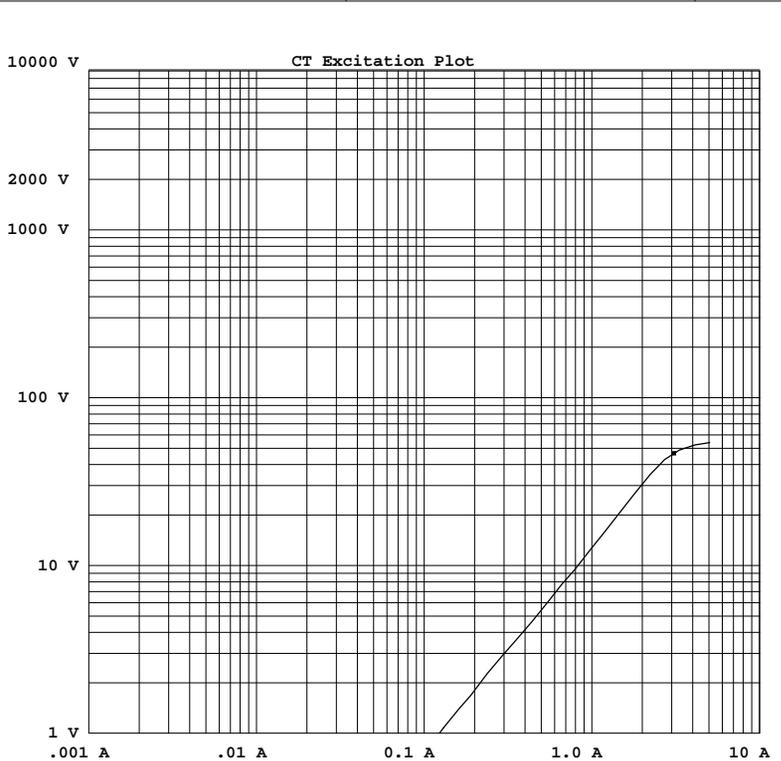
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	0.00	0.00	12	0.4000	18.60	46.50
2	0.0040	0.10	25.00	13	0.5000	25.20	50.40
3	0.0050	0.10	20.00	14	0.8000	46.70	58.38
4	0.0080	0.20	25.00	15	1.0000	61.40	61.40
5	0.0100	0.20	20.00	16	2.0000	103.80	51.90
6	0.0200	0.40	20.00				
7	0.0400	0.40	10.00				
8	0.0500	0.80	16.00				
9	0.0800	2.00	25.00				
10	0.1000	2.80	28.00				
11	0.2000	7.60	38.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.14°
Vkp[Volts]: 46.56	Vkp[Volts]: 39.24	Vkp[Volts]: 0.00	M-RATIO: 10.100	Ex I[Amps]: 0.775	In Phase
Ikp[Amps]: 3.0984	Ikp[Amps]: 2.4998	Ikp[Amps]: 0.0000	% ERROR: 0.9970	Winding Res: 131.21 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0376	0.24	6.38	17	1.4670	20.68	14.10
2	0.0504	0.32	6.35	18	1.8046	26.96	14.94
3	0.0680	0.48	7.06	19	2.2364	35.00	15.65
4	0.0878	0.64	7.29	20	2.7168	42.76	15.74
5	0.1306	1.08	8.27	21	3.3302	48.84	14.67
6	0.1614	1.40	8.67	22	4.1190	52.28	12.69
7	0.1896	1.68	8.86	23	5.0474	54.12	10.72
8	0.2390	2.28	9.54				
9	0.3010	3.00	9.97				
10	0.3536	3.60	10.18				
11	0.4402	4.64	10.54				
12	0.5508	6.12	11.11				
13	0.6632	7.76	11.70				
14	0.7952	9.52	11.97				
15	0.9758	12.36	12.67				
16	1.1984	15.96	13.32				

GRAPH POINTS

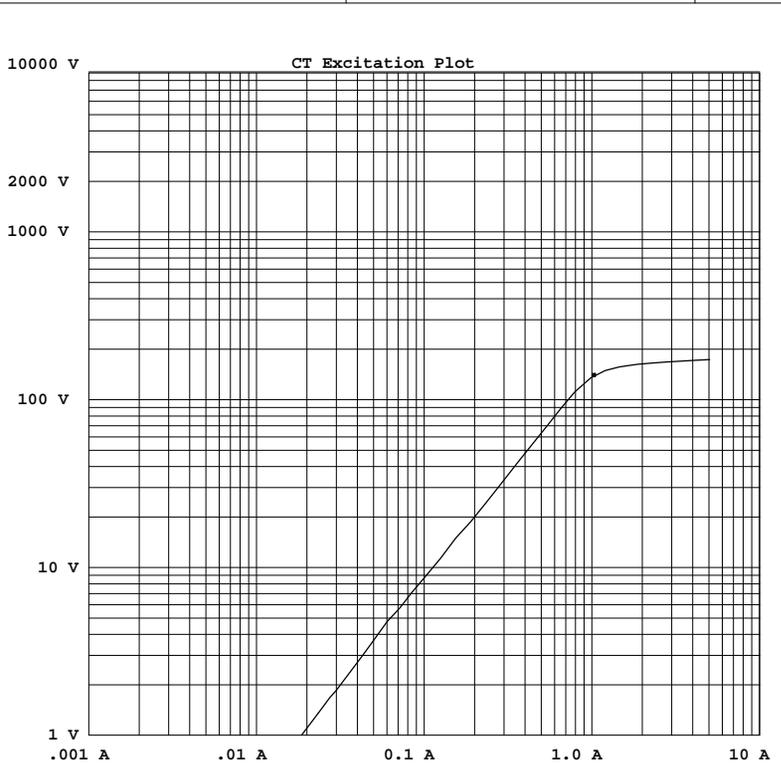
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.00	10.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	13.00	13.00
4	0.0100	0.10	10.00	15	2.0000	31.50	15.75
5	0.0200	0.20	10.00				
6	0.0400	0.30	7.50				
7	0.0500	0.40	8.00				
8	0.0800	0.30	3.75				
9	0.1000	0.20	2.00				
10	0.2000	1.10	5.50				
11	0.4000	3.60	9.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 93.000	Phase Angle:0.32°
Vkp[Volts]: 140.20	Vkp[Volts]: 112.44	Vkp[Volts]: 143.60	M-RATIO: 30.054	Ex I[Amps]: 0.676	In Phase
Ikp[Amps]: 1.0268	Ikp[Amps]: 0.7992	Ikp[Amps]: 1.1148	% ERROR: 0.1810	Winding Res: 185.70 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0126	0.60	47.62	17	0.3568	41.60	116.59
2	0.0180	0.96	53.33	18	0.4366	53.44	122.40
3	0.0234	1.36	58.12	19	0.5274	67.64	128.25
4	0.0274	1.68	61.31	20	0.6554	89.04	135.86
5	0.0298	1.84	61.74	21	0.7926	111.36	140.50
6	0.0426	2.96	69.48	22	0.9832	134.84	137.14
7	0.0500	3.68	73.60	23	1.2022	149.44	124.31
8	0.0602	4.76	79.07	24	1.4642	157.00	107.23
9	0.0718	5.76	80.22	25	1.8664	162.44	87.03
10	0.0846	7.12	84.16	26	2.2300	165.12	74.04
11	0.1022	8.88	86.89	27	2.7266	167.56	61.45
12	0.1256	11.40	90.76	28	3.3920	170.00	50.12
13	0.1544	14.96	96.89	29	4.0996	171.60	41.86
14	0.1896	18.76	98.95	30	5.0474	173.52	34.38
15	0.2328	24.16	103.78				
16	0.2886	31.76	110.05				

GRAPH POINTS

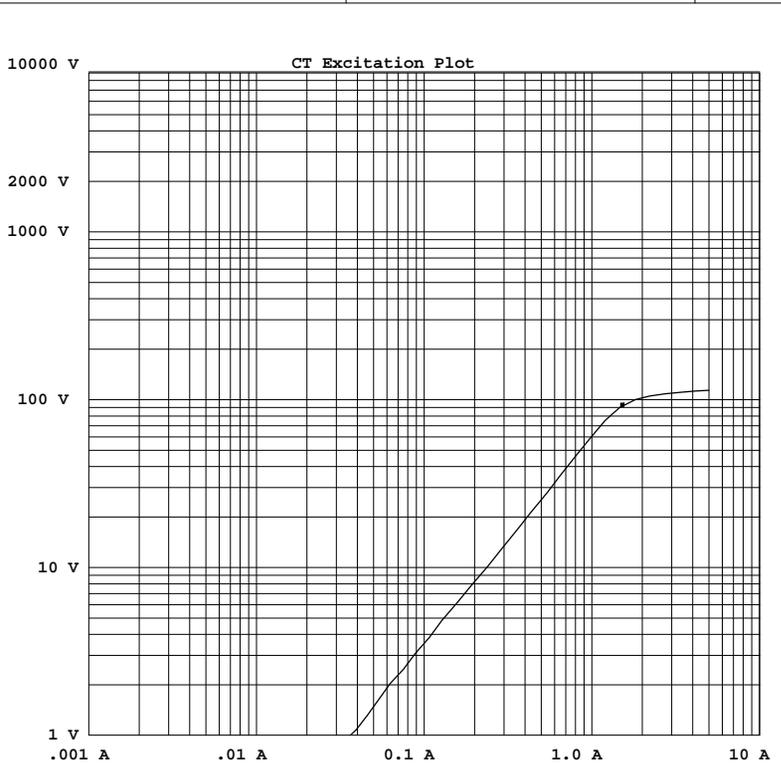
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	19.40	97.00
2	0.0020	0.10	50.00	13	0.4000	47.20	118.00
3	0.0040	0.20	50.00	14	0.5000	63.30	126.60
4	0.0050	0.30	60.00	15	0.8000	111.80	139.75
5	0.0080	0.50	62.50	16	1.0000	135.00	135.00
6	0.0100	0.60	60.00	17	2.0000	162.80	81.40
7	0.0200	1.30	65.00				
8	0.0400	2.60	65.00				
9	0.0500	3.20	64.00				
10	0.0800	5.80	72.50				
11	0.1000	7.90	79.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 45.000	Phase Angle:0.26°
Vkp[Volts]: 93.08	Vkp[Volts]: 76.32	Vkp[Volts]: 96.56	M-RATIO: 20.065	Ex I[Amps]: 0.781	In Phase
Ikp[Amps]: 1.5240	Ikp[Amps]: 1.2180	Ikp[Amps]: 1.6940	% ERROR: 0.3240	Winding Res: 158.92 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0208	0.48	23.08	17	0.5434	28.00	51.53
2	0.0282	0.72	25.53	18	0.6452	35.12	54.43
3	0.0332	0.92	27.71	19	0.8046	46.36	57.62
4	0.0394	1.08	27.41	20	0.9848	59.44	60.36
5	0.0460	1.32	28.70	21	1.2034	75.28	62.56
6	0.0628	2.04	32.48	22	1.4688	90.00	61.27
7	0.0754	2.48	32.89	23	1.8242	100.40	55.04
8	0.0886	3.08	34.76	24	2.2170	105.28	47.49
9	0.1076	3.84	35.69	25	2.7460	108.64	39.56
10	0.1276	4.84	37.93	26	3.3724	110.80	32.85
11	0.1606	6.32	39.35	27	4.1224	112.56	27.30
12	0.1934	7.92	40.95	28	5.0020	113.92	22.77
13	0.2390	10.12	42.34				
14	0.2850	12.64	44.35				
15	0.3740	17.68	47.27				
16	0.4304	21.20	49.26				

GRAPH POINTS

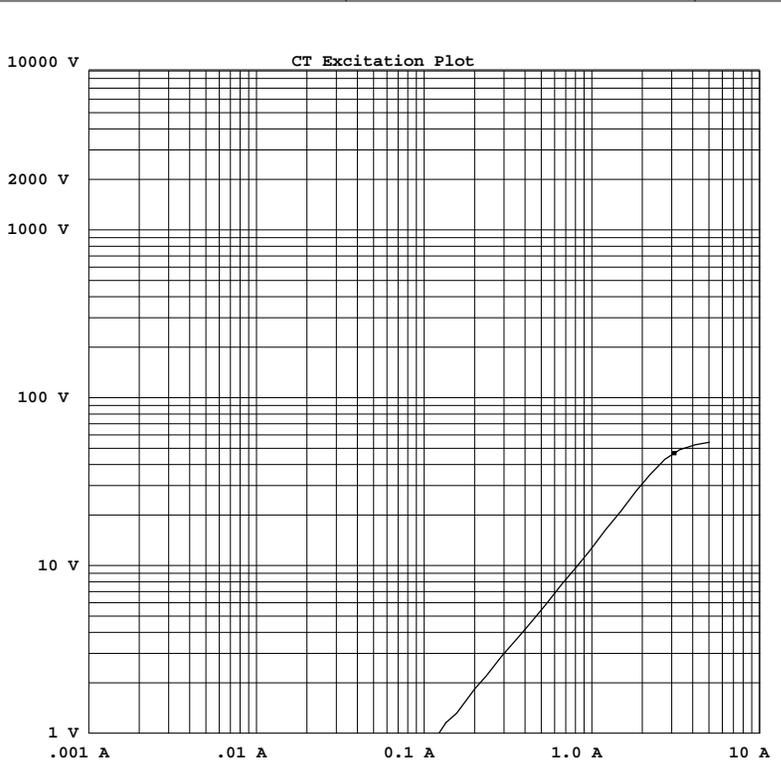
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	0.00	0.00	12	0.4000	18.40	46.00
2	0.0040	0.10	25.00	13	0.5000	24.80	49.60
3	0.0050	0.10	20.00	14	0.8000	45.70	57.13
4	0.0080	0.20	25.00	15	1.0000	60.40	60.40
5	0.0100	0.20	20.00	16	2.0000	102.60	51.30
6	0.0200	0.40	20.00				
7	0.0400	0.40	10.00				
8	0.0500	0.70	14.00				
9	0.0800	1.90	23.75				
10	0.1000	2.80	28.00				
11	0.2000	7.50	37.50				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.16°
Vkp[Volts]: 46.72	Vkp[Volts]: 39.28	Vkp[Volts]: 0.00	M-RATIO: 10.112	Ex I[Amps]: 0.776	In Phase
Ikp[Amps]: 3.1114	Ikp[Amps]: 2.4990	Ikp[Amps]: 0.0000	% ERROR: 1.1230	Winding Res: 154.91 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0360	0.24	6.67	17	0.7964	9.60	12.05
2	0.0442	0.28	6.33	18	0.9746	12.28	12.60
3	0.0538	0.32	5.95	19	1.2050	16.28	13.51
4	0.0578	0.40	6.92	20	1.4872	21.00	14.12
5	0.0758	0.56	7.39	21	1.8338	27.68	15.09
6	0.0894	0.68	7.61	22	2.2234	34.80	15.65
7	0.1092	0.84	7.69	23	2.7266	42.96	15.76
8	0.1350	1.16	8.59	24	3.3466	49.04	14.65
9	0.1568	1.32	8.42	25	4.1288	52.48	12.71
10	0.2004	1.84	9.18	26	5.0312	54.32	10.80
11	0.2348	2.20	9.37				
12	0.2904	2.88	9.92				
13	0.3662	3.76	10.27				
14	0.4382	4.64	10.59				
15	0.5306	5.84	11.01				
16	0.6666	7.80	11.70				

GRAPH POINTS

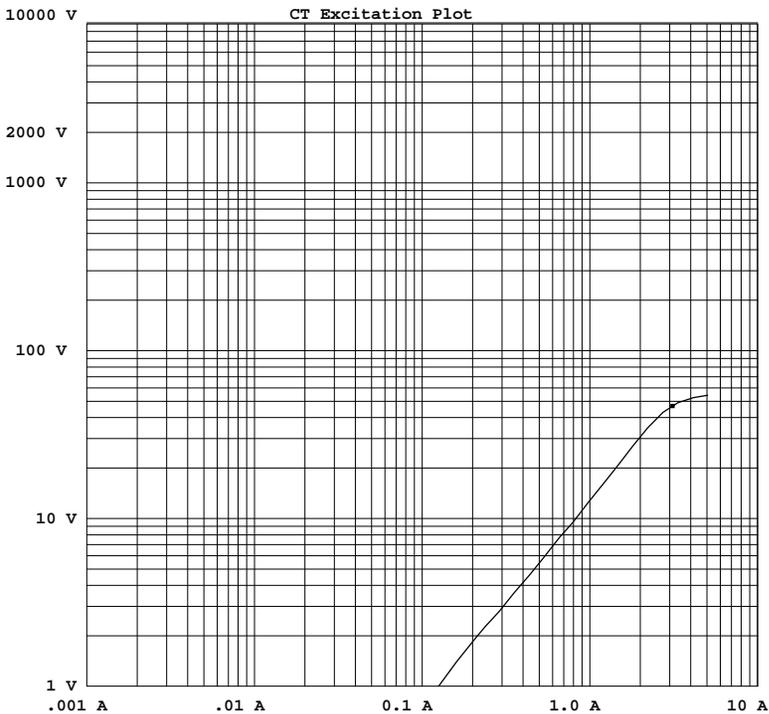
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	4.80	9.60
2	0.0050	0.00	0.00	13	0.8000	9.20	11.50
3	0.0080	0.10	12.50	14	1.0000	12.40	12.40
4	0.0100	0.10	10.00	15	2.0000	30.80	15.40
5	0.0200	0.20	10.00				
6	0.0400	0.40	10.00				
7	0.0500	0.50	10.00				
8	0.0800	0.30	3.75				
9	0.1000	0.20	2.00				
10	0.2000	1.00	5.00				
11	0.4000	3.60	9.00				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.300	Phase Angle:-0.06°
Vkp[Volts]: 46.76	Vkp[Volts]: 39.00	Vkp[Volts]: 0.00	M-RATIO: 10.086	Ex I[Amps]: 0.771	In Phase
Ikp[Amps]: 3.1206	Ikp[Amps]: 2.4820	Ikp[Amps]: 0.0000	% ERROR: 0.8610	Winding Res: 113.37 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0220	0.12	5.45	17	0.6600	7.72	11.70
2	0.0294	0.16	5.44	18	0.7922	9.48	11.97
3	0.0398	0.24	6.03	19	0.9784	12.48	12.76
4	0.0508	0.32	6.30	20	1.2318	16.60	13.48
5	0.0624	0.40	6.41	21	1.4732	20.76	14.09
6	0.0676	0.48	7.10	22	1.8046	27.04	14.98
7	0.1002	0.76	7.58	23	2.2170	34.80	15.70
8	0.1104	0.84	7.61	24	2.7298	42.92	15.72
9	0.1466	1.24	8.46	25	3.3530	49.04	14.63
10	0.1606	1.40	8.72	26	4.1548	52.56	12.65
11	0.2102	1.96	9.32	27	5.0376	54.32	10.78
12	0.2386	2.28	9.56				
13	0.2886	2.80	9.70				
14	0.3528	3.60	10.20				
15	0.4362	4.60	10.55				
16	0.5330	5.88	11.03				

GRAPH POINTS

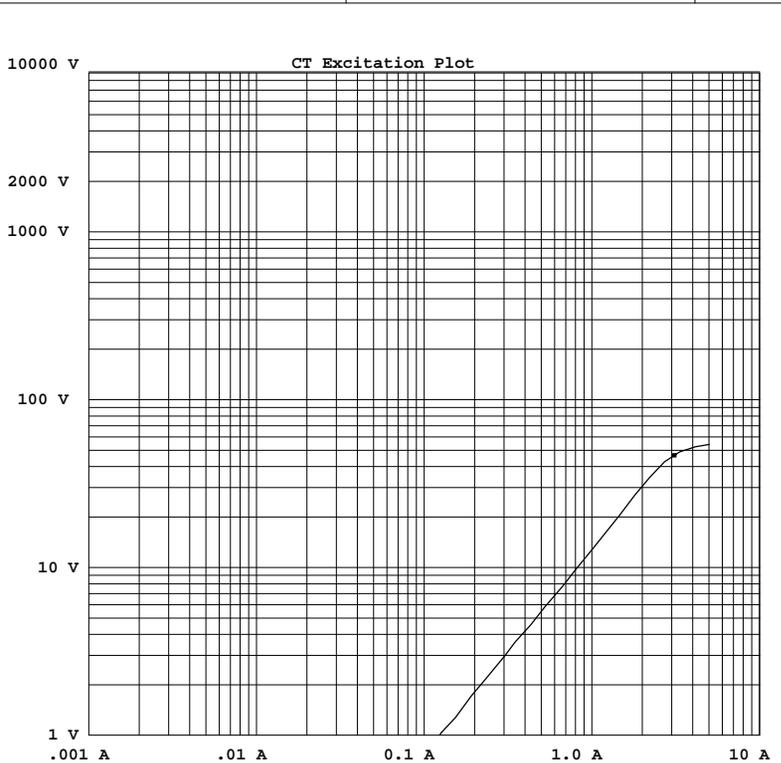
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0200	0.00	0.00				
2	0.0400	0.10	2.50				
3	0.0500	0.10	2.00				
4	0.0800	0.20	2.50				
5	0.1000	0.20	2.00				
6	0.2000	1.00	5.00				
7	0.4000	3.40	8.50				
8	0.5000	4.70	9.40				
9	0.8000	9.00	11.25				
10	1.0000	12.10	12.10				
11	2.0000	29.90	14.95				

FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:0.02°
Vkp[Volts]: 46.64	Vkp[Volts]: 39.16	Vkp[Volts]: 0.00	M-RATIO: 10.069	Ex I[Amps]: 0.771	In Phase
Ikp[Amps]: 3.1128	Ikp[Amps]: 2.5024	Ikp[Amps]: 0.0000	% ERROR: 0.6930	Winding Res: 91.98 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0224	0.12	5.36	17	0.8034	9.76	12.15
2	0.0336	0.20	5.95	18	0.9944	12.64	12.71
3	0.0422	0.28	6.64	19	1.2256	16.44	13.41
4	0.0560	0.36	6.43	20	1.4658	20.56	14.03
5	0.0710	0.52	7.32	21	1.7982	26.88	14.95
6	0.0836	0.60	7.18	22	2.2072	34.32	15.55
7	0.1058	0.80	7.56	23	2.7168	42.68	15.71
8	0.1268	1.04	8.20	24	3.3432	48.92	14.63
9	0.1540	1.28	8.31	25	4.1418	52.44	12.66
10	0.1914	1.72	8.99	26	5.0150	54.24	10.82
11	0.2320	2.16	9.31				
12	0.3046	3.00	9.85				
13	0.3494	3.60	10.30				
14	0.4324	4.56	10.55				
15	0.5260	5.84	11.10				
16	0.6710	7.76	11.56				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0200	0.00	0.00				
2	0.0400	0.10	2.50				
3	0.0500	0.10	2.00				
4	0.0800	0.20	2.50				
5	0.1000	0.20	2.00				
6	0.2000	1.00	5.00				
7	0.4000	3.40	8.50				
8	0.5000	4.80	9.60				
9	0.8000	8.80	11.00				
10	1.0000	11.90	11.90				
11	2.0000	29.60	14.80				

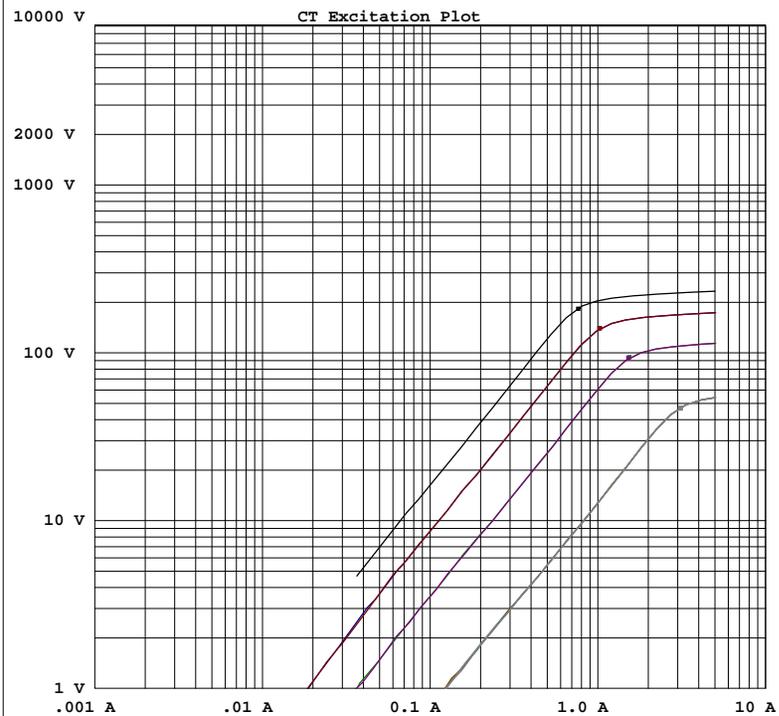
FILENAME: Piapot CTs HV (H1X1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	46.56/3.0984	39.24/2.4998	0.00/0.0000	50/5.0	10.100	0.997 %	-0.14° [In Ø]	131.21 m-ohms
2	X1-X3	94.08/1.5420	76.40/1.2210	96.12/1.6708	100/5.0	20.066	0.331 %	0.26° [In Ø]	144.17 m-ohms
3	X1-X4	140.12/1.0254	112.92/0.8060	143.08/1.1084	150/5.0	30.048	0.159 %	0.34° [In Ø]	153.65 m-ohms
4	X1-X5	182.80/0.7644	152.04/0.6114	191.96/0.8292	200/5.0	40.067	0.168 %	0.28° [In Ø]	180.39 m-ohms
5	X2-X3	46.72/3.1114	39.28/2.4990	0.00/0.0000	50/5.0	10.112	1.123 %	-0.16° [In Ø]	154.91 m-ohms
6	X2-X4	93.08/1.5240	76.32/1.2180	96.56/1.6940	100/5.0	20.065	0.324 %	0.26° [In Ø]	158.92 m-ohms
7	X2-X5	140.20/1.0268	112.44/0.7992	143.60/1.1148	150/5.0	30.054	0.181 %	0.32° [In Ø]	185.70 m-ohms
8	X3-X4	46.76/3.1206	39.00/2.4820	0.00/0.0000	50/5.0	10.086	0.861 %	-0.06° [In Ø]	113.37 m-ohms
10	X4-X5	46.64/3.1128	39.16/2.5024	0.00/0.0000	50/5.0	10.069	0.693 %	0.02° [In Ø]	91.98 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H1X1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 13:17:49

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	

Burden Test []

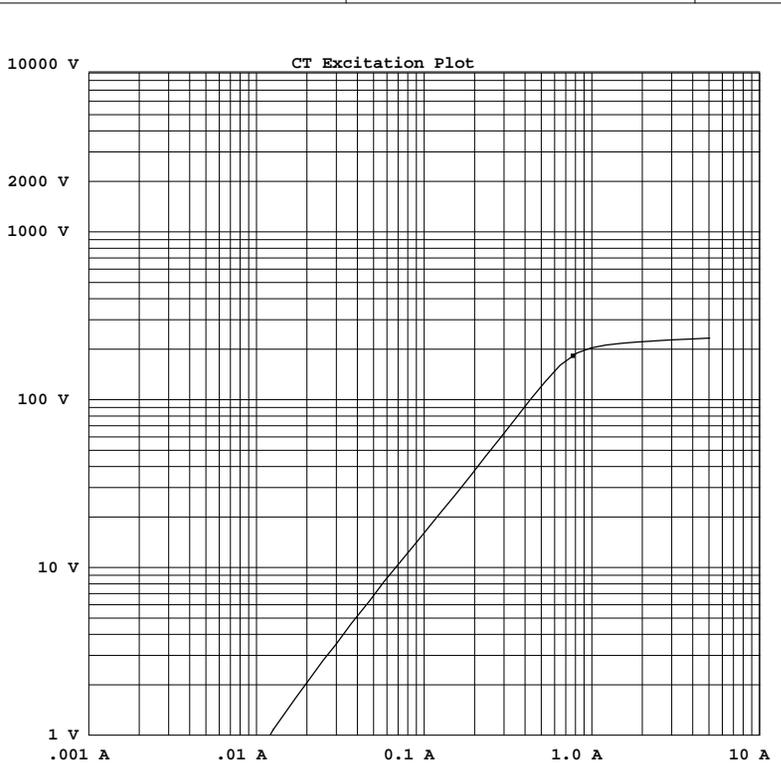
Insulation Test []

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 97.300	Phase Angle:0.32°
Vkp[Volts]: 182.52	Vkp[Volts]: 151.00	Vkp[Volts]: 192.52	M-RATIO: 40.060	Ex I[Amps]: 0.418	In Phase
Ikp[Amps]: 0.7722	Ikp[Amps]: 0.6114	Ikp[Amps]: 0.8472	% ERROR: 0.1497	Winding Res: 179.53 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0090	0.60	66.67	17	0.2850	59.20	207.72
2	0.0126	1.08	85.71	18	0.3516	77.28	219.80
3	0.0172	1.68	97.67	19	0.4328	101.08	233.55
4	0.0204	2.12	103.92	20	0.5268	127.96	242.90
5	0.0250	2.80	112.00	21	0.6464	160.52	248.33
6	0.0298	3.48	116.78	22	0.8148	190.00	233.19
7	0.0368	4.64	126.09	23	0.9906	203.76	205.69
8	0.0472	6.32	133.90	24	1.2140	211.60	174.30
9	0.0578	8.28	143.25	25	1.5032	216.76	144.20
10	0.0722	10.80	149.58	26	1.8014	220.24	122.26
11	0.0870	13.56	155.86	27	2.2850	223.76	97.93
12	0.1026	16.60	161.79	28	2.7948	226.72	81.12
13	0.1260	21.36	169.52	29	3.3562	228.64	68.12
14	0.1544	27.28	176.68	30	4.0964	230.80	56.34
15	0.1934	36.20	187.18	31	5.0474	232.96	46.15
16	0.2320	45.88	197.76				

GRAPH POINTS

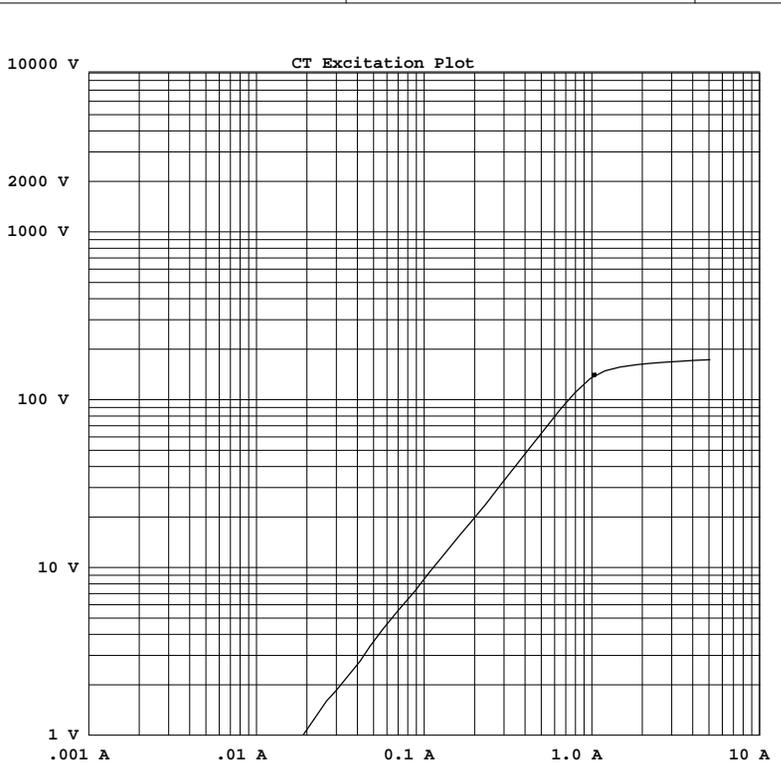
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	37.80	189.00
2	0.0020	0.00	0.00	13	0.4000	91.50	228.75
3	0.0040	0.10	25.00	14	0.5000	122.20	244.40
4	0.0050	0.10	20.00	15	0.8000	187.10	233.87
5	0.0080	0.20	25.00	16	1.0000	203.70	203.70
6	0.0100	0.30	30.00	17	2.0000	222.10	111.05
7	0.0200	1.40	70.00				
8	0.0400	4.70	117.50				
9	0.0500	6.30	126.00				
10	0.0800	11.70	146.25				
11	0.1000	15.80	158.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.900	Phase Angle:0.30°
Vkp[Volts]: 140.48	Vkp[Volts]: 112.44	Vkp[Volts]: 142.96	M-RATIO: 30.058	Ex I[Amps]: 0.692	In Phase
Ikp[Amps]: 1.0322	Ikp[Amps]: 0.8084	Ikp[Amps]: 1.1136	% ERROR: 0.1940	Winding Res: 150.80 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0126	0.56	44.44	17	0.2850	30.96	108.63
2	0.0138	0.64	46.38	18	0.3528	40.60	115.08
3	0.0168	0.84	50.00	19	0.4328	52.56	121.44
4	0.0220	1.24	56.36	20	0.5264	67.24	127.74
5	0.0262	1.60	61.07	21	0.6472	87.28	134.86
6	0.0298	1.84	61.74	22	0.7960	110.52	138.84
7	0.0414	2.76	66.67	23	0.9792	133.76	136.60
8	0.0476	3.40	71.43	24	1.1964	148.64	124.24
9	0.0566	4.28	75.62	25	1.4758	156.76	106.22
10	0.0698	5.52	79.08	26	1.8632	161.88	86.88
11	0.0882	7.24	82.09	27	2.2202	164.84	74.25
12	0.1066	9.28	87.05	28	2.7070	167.28	61.80
13	0.1280	11.56	90.31	29	3.3596	169.44	50.43
14	0.1626	15.52	95.45	30	4.1190	171.60	41.66
15	0.1888	18.48	97.88	31	5.0670	173.24	34.19
16	0.2324	23.80	102.41				

GRAPH POINTS

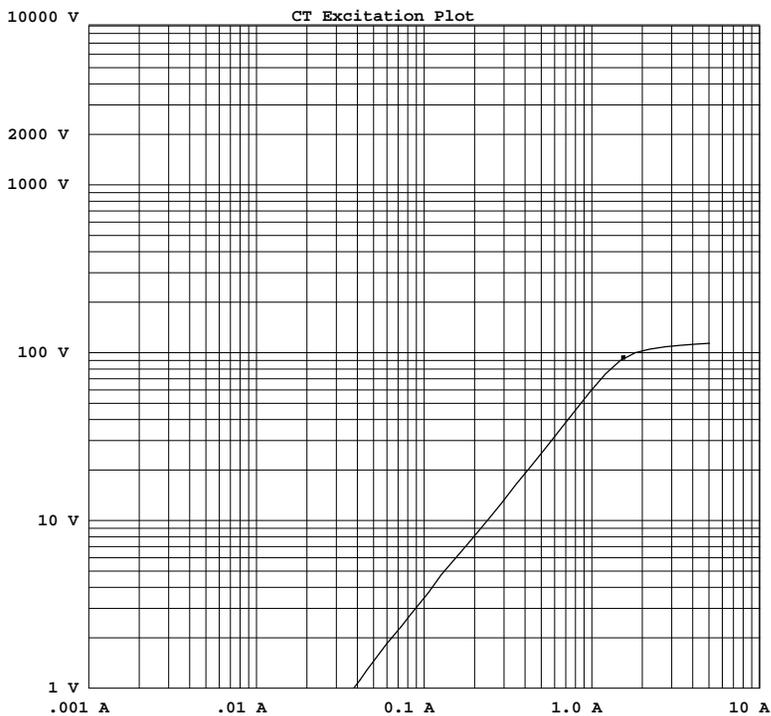
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	19.70	98.50
2	0.0020	0.00	0.00	13	0.4000	47.80	119.50
3	0.0040	0.10	25.00	14	0.5000	64.10	128.20
4	0.0050	0.10	20.00	15	0.8000	112.40	140.50
5	0.0080	0.20	25.00	16	1.0000	135.90	135.90
6	0.0100	0.20	20.00	17	2.0000	163.60	81.80
7	0.0200	0.60	30.00				
8	0.0400	2.10	52.50				
9	0.0500	2.90	58.00				
10	0.0800	5.90	73.75				
11	0.1000	8.00	80.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.600	Phase Angle:0.20°
Vkp[Volts]: 93.64	Vkp[Volts]: 76.52	Vkp[Volts]: 96.72	M-RATIO: 20.059	Ex I[Amps]: 0.780	In Phase
Ikp[Amps]: 1.5438	Ikp[Amps]: 1.2324	Ikp[Amps]: 1.7068	% ERROR: 0.2975	Winding Res: 145.73 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0286	0.68	23.78	17	0.6514	35.08	53.85
2	0.0308	0.76	24.68	18	0.8062	45.96	57.01
3	0.0414	1.12	27.05	19	0.9734	58.24	59.83
4	0.0454	1.28	28.19	20	1.2088	74.84	61.91
5	0.0598	1.84	30.77	21	1.4790	90.00	60.85
6	0.0738	2.36	31.98	22	1.8210	100.12	54.98
7	0.0832	2.76	33.17	23	2.2104	105.00	47.50
8	0.1062	3.72	35.03	24	2.7428	108.52	39.57
9	0.1268	4.76	37.54	25	3.3660	110.68	32.88
10	0.1642	6.44	39.22	26	4.0932	112.28	27.43
11	0.1896	7.60	40.08	27	5.0442	113.92	22.58
12	0.2340	9.80	41.88				
13	0.2886	12.64	43.80				
14	0.3548	16.52	46.56				
15	0.4288	20.76	48.41				
16	0.5412	27.68	51.15				

GRAPH POINTS

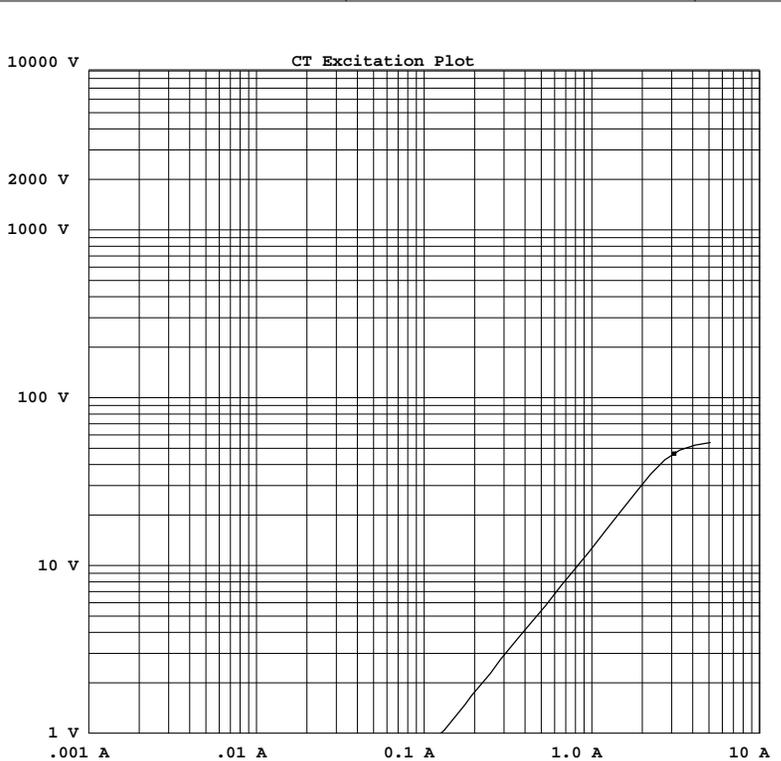
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	0.00	0.00	12	0.4000	18.60	46.50
2	0.0040	0.10	25.00	13	0.5000	25.20	50.40
3	0.0050	0.10	20.00	14	0.8000	46.70	58.38
4	0.0080	0.20	25.00	15	1.0000	61.40	61.40
5	0.0100	0.20	20.00	16	2.0000	103.80	51.90
6	0.0200	0.40	20.00				
7	0.0400	0.40	10.00				
8	0.0500	0.80	16.00				
9	0.0800	2.00	25.00				
10	0.1000	2.80	28.00				
11	0.2000	7.60	38.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.10°
Vkp[Volts]: 46.36	Vkp[Volts]: 38.96	Vkp[Volts]: 0.00	M-RATIO: 10.097	Ex I[Amps]: 0.771	In Phase
Ikp[Amps]: 3.1018	Ikp[Amps]: 2.4876	Ikp[Amps]: 0.0000	% ERROR: 0.9720	Winding Res: 127.96 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0656	0.44	6.71	17	1.4736	20.76	14.09
2	0.0694	0.48	6.92	18	1.8242	27.16	14.89
3	0.0928	0.68	7.33	19	2.2396	35.00	15.63
4	0.1198	0.96	8.01	20	2.7200	42.64	15.68
5	0.1314	1.04	7.91	21	3.3336	48.64	14.59
6	0.1752	1.48	8.45	22	4.1288	52.16	12.63
7	0.1918	1.68	8.76	23	5.0864	54.04	10.62
8	0.2488	2.28	9.16				
9	0.2854	2.76	9.67				
10	0.3626	3.68	10.15				
11	0.4378	4.60	10.51				
12	0.5326	5.80	10.89				
13	0.6566	7.60	11.57				
14	0.7984	9.60	12.02				
15	0.9734	12.20	12.53				
16	1.2006	16.00	13.33				

GRAPH POINTS

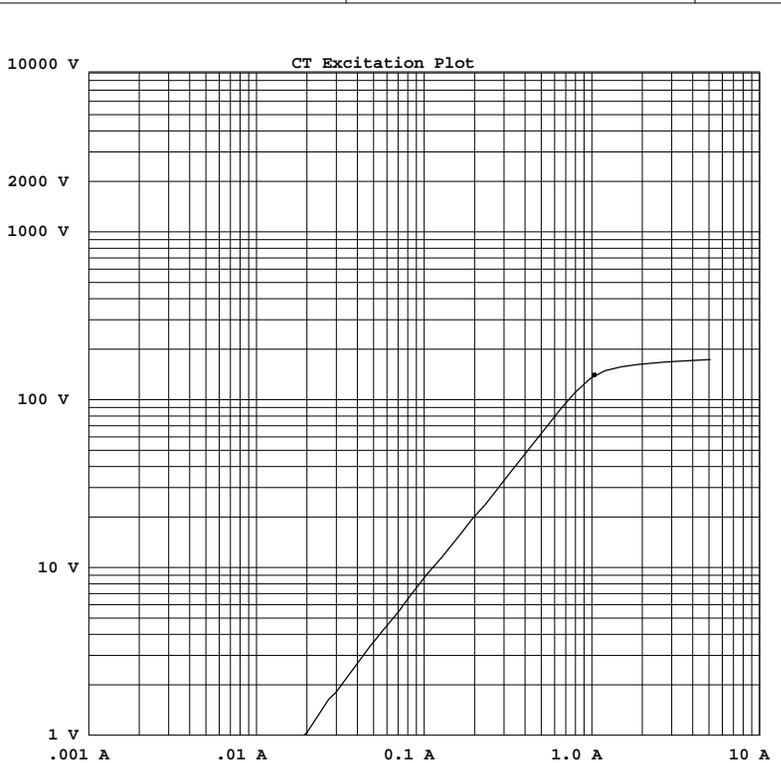
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.00	10.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	13.00	13.00
4	0.0100	0.10	10.00	15	2.0000	31.50	15.75
5	0.0200	0.20	10.00				
6	0.0400	0.30	7.50				
7	0.0500	0.40	8.00				
8	0.0800	0.30	3.75				
9	0.1000	0.20	2.00				
10	0.2000	1.10	5.50				
11	0.4000	3.60	9.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.800	Phase Angle:0.28°
Vkp[Volts]: 140.52	Vkp[Volts]: 112.68	Vkp[Volts]: 142.72	M-RATIO: 30.053	Ex I[Amps]: 0.691	In Phase
Ikp[Amps]: 1.0312	Ikp[Amps]: 0.8082	Ikp[Amps]: 1.1088	% ERROR: 0.1753	Winding Res: 181.77 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0184	0.96	52.17	17	0.4340	52.68	121.38
2	0.0200	1.04	52.00	18	0.5260	67.04	127.45
3	0.0270	1.64	60.74	19	0.6498	87.56	134.75
4	0.0298	1.80	60.40	20	0.7938	110.40	139.08
5	0.0382	2.52	65.97	21	0.9792	133.92	136.76
6	0.0472	3.36	71.19	22	1.1998	148.92	124.12
7	0.0558	4.12	73.84	23	1.4938	157.00	105.10
8	0.0698	5.40	77.36	24	1.8794	162.16	86.28
9	0.0832	6.84	82.21	25	2.2266	164.84	74.03
10	0.1038	9.12	87.86	26	2.7136	167.56	61.75
11	0.1272	11.48	90.25	27	3.3724	169.72	50.33
12	0.1642	15.76	95.98	28	4.1320	171.60	41.53
13	0.1938	19.48	100.52	29	5.0896	173.52	34.09
14	0.2320	23.76	102.41				
15	0.2874	31.32	108.98				
16	0.3540	40.80	115.25				

GRAPH POINTS

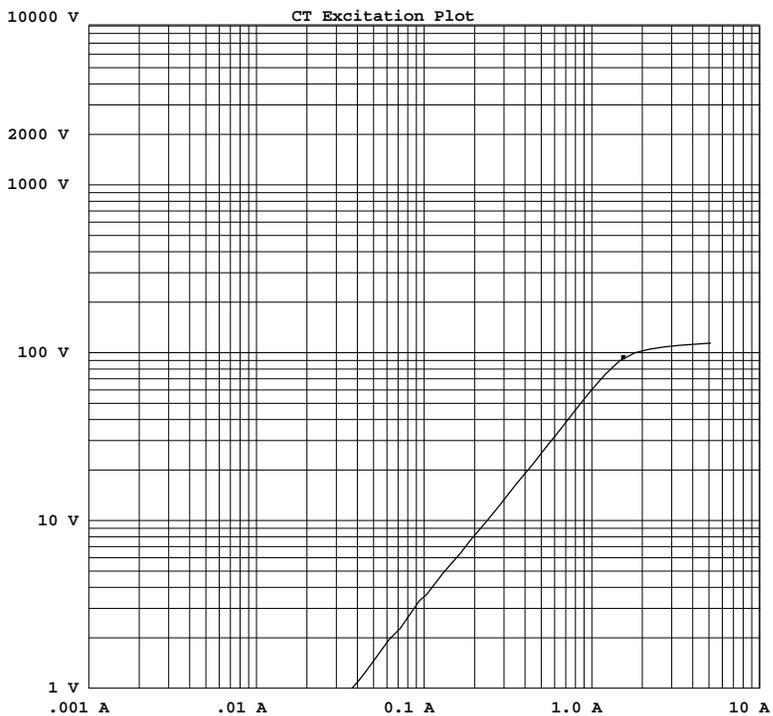
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	19.40	97.00
2	0.0020	0.10	50.00	13	0.4000	47.20	118.00
3	0.0040	0.20	50.00	14	0.5000	63.30	126.60
4	0.0050	0.30	60.00	15	0.8000	111.80	139.75
5	0.0080	0.50	62.50	16	1.0000	135.00	135.00
6	0.0100	0.60	60.00	17	2.0000	162.80	81.40
7	0.0200	1.30	65.00				
8	0.0400	2.60	65.00				
9	0.0500	3.20	64.00				
10	0.0800	5.80	72.50				
11	0.1000	7.90	79.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.500	Phase Angle:0.24°
Vkp[Volts]: 93.88	Vkp[Volts]: 77.04	Vkp[Volts]: 96.60	M-RATIO: 20.069	Ex I[Amps]: 0.779	In Phase
Ikp[Amps]: 1.5430	Ikp[Amps]: 1.2400	Ikp[Amps]: 1.6982	% ERROR: 0.3445	Winding Res: 152.97 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0344	0.92	26.74	17	0.7972	45.52	57.10
2	0.0410	1.12	27.32	18	0.9754	58.44	59.91
3	0.0454	1.28	28.19	19	1.2050	74.60	61.91
4	0.0620	1.96	31.61	20	1.4680	89.60	61.04
5	0.0722	2.28	31.58	21	1.8046	99.84	55.33
6	0.0936	3.32	35.47	22	2.2136	105.12	47.49
7	0.1038	3.64	35.07	23	2.7070	108.24	39.99
8	0.1302	4.88	37.48	24	3.3238	110.68	33.30
9	0.1658	6.44	38.84	25	4.1320	112.44	27.21
10	0.1900	7.68	40.42	26	5.1058	114.04	22.34
11	0.2316	9.68	41.80				
12	0.2850	12.48	43.79				
13	0.3568	16.64	46.64				
14	0.4480	21.84	48.75				
15	0.5264	26.92	51.14				
16	0.6468	34.72	53.68				

GRAPH POINTS

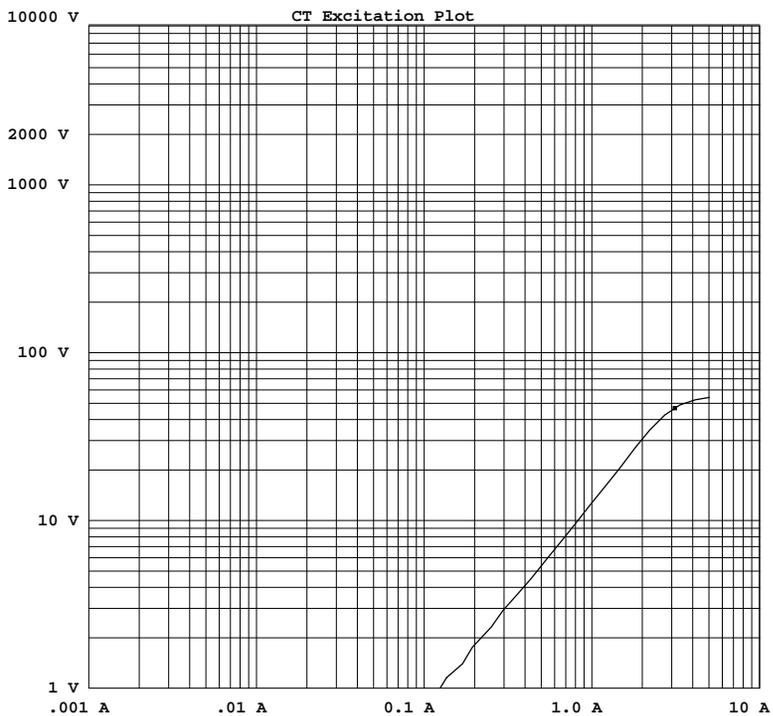
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	0.00	0.00	12	0.4000	18.40	46.00
2	0.0040	0.10	25.00	13	0.5000	24.80	49.60
3	0.0050	0.10	20.00	14	0.8000	45.70	57.13
4	0.0080	0.20	25.00	15	1.0000	60.40	60.40
5	0.0100	0.20	20.00	16	2.0000	102.60	51.30
6	0.0200	0.40	20.00				
7	0.0400	0.40	10.00				
8	0.0500	0.70	14.00				
9	0.0800	1.90	23.75				
10	0.1000	2.80	28.00				
11	0.2000	7.50	37.50				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:0.00°
Vkp[Volts]: 46.68	Vkp[Volts]: 38.72	Vkp[Volts]: 0.00	M-RATIO: 10.113	Ex I[Amps]: 0.772	In Phase
Ikp[Amps]: 3.1314	Ikp[Amps]: 2.4792	Ikp[Amps]: 0.0000	% ERROR: 1.1280	Winding Res: 146.61 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0532	0.32	6.02	17	1.4688	20.48	13.94
2	0.0746	0.52	6.97	18	1.8210	27.28	14.98
3	0.0920	0.72	7.83	19	2.2170	34.60	15.61
4	0.1050	0.76	7.24	20	2.7232	42.56	15.63
5	0.1362	1.16	8.52	21	3.3466	48.84	14.59
6	0.1696	1.40	8.25	22	4.1450	52.44	12.65
7	0.1942	1.76	9.06	23	5.0214	54.24	10.80
8	0.2516	2.32	9.22				
9	0.2956	2.92	9.88				
10	0.3502	3.52	10.05				
11	0.4358	4.52	10.37				
12	0.5462	6.00	10.98				
13	0.6654	7.64	11.48				
14	0.8098	9.76	12.05				
15	0.9738	12.32	12.65				
16	1.2084	16.08	13.31				

GRAPH POINTS

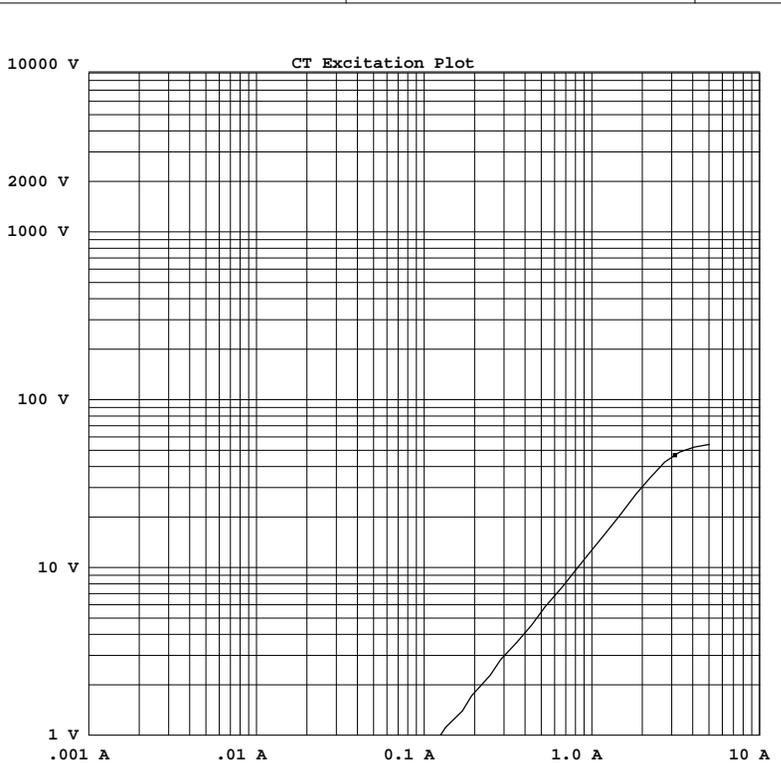
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	4.80	9.60
2	0.0050	0.00	0.00	13	0.8000	9.20	11.50
3	0.0080	0.10	12.50	14	1.0000	12.40	12.40
4	0.0100	0.10	10.00	15	2.0000	30.80	15.40
5	0.0200	0.20	10.00				
6	0.0400	0.40	10.00				
7	0.0500	0.50	10.00				
8	0.0800	0.30	3.75				
9	0.1000	0.20	2.00				
10	0.2000	1.00	5.00				
11	0.4000	3.60	9.00				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.100	Phase Angle:-0.04°
Vkp[Volts]: 46.68	Vkp[Volts]: 39.24	Vkp[Volts]: 0.00	M-RATIO: 10.081	Ex I[Amps]: 0.768	In Phase
Ikp[Amps]: 3.1378	Ikp[Amps]: 2.5236	Ikp[Amps]: 0.0000	% ERROR: 0.8140	Winding Res: 109.47 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0364	0.20	5.49	17	1.2154	16.16	13.30
2	0.0526	0.32	6.08	18	1.4650	20.36	13.90
3	0.0738	0.52	7.05	19	1.8306	27.28	14.90
4	0.0902	0.68	7.54	20	2.2104	34.04	15.40
5	0.1042	0.76	7.29	21	2.7200	42.48	15.62
6	0.1346	1.12	8.32	22	3.3466	48.80	14.58
7	0.1696	1.40	8.25	23	4.0768	52.16	12.79
8	0.1918	1.72	8.97	24	5.0182	54.20	10.80
9	0.2480	2.28	9.19				
10	0.2870	2.84	9.90				
11	0.3552	3.56	10.02				
12	0.4398	4.56	10.37				
13	0.5268	5.84	11.09				
14	0.6658	7.64	11.47				
15	0.8140	9.84	12.09				
16	0.9766	12.36	12.66				

GRAPH POINTS

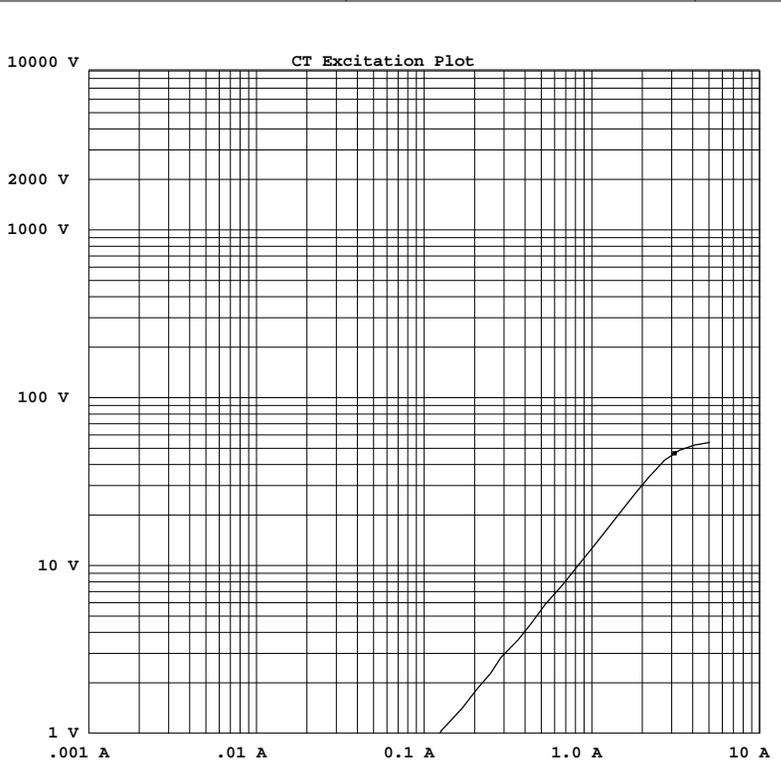
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0200	0.00	0.00				
2	0.0400	0.10	2.50				
3	0.0500	0.10	2.00				
4	0.0800	0.20	2.50				
5	0.1000	0.20	2.00				
6	0.2000	1.00	5.00				
7	0.4000	3.40	8.50				
8	0.5000	4.70	9.40				
9	0.8000	9.00	11.25				
10	1.0000	12.10	12.10				
11	2.0000	29.90	14.95				

FILENAME: Piapot CTs HV (HIY1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.100	Phase Angle:0.00°
Vkp[Volts]: 46.56	Vkp[Volts]: 39.36	Vkp[Volts]: 0.00	M-RATIO: 10.070	Ex I[Amps]: 0.768	In Phase
Ikp[Amps]: 3.1196	Ikp[Amps]: 2.5320	Ikp[Amps]: 0.0000	% ERROR: 0.7050	Winding Res: 89.22 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0316	0.16	5.06	17	1.2158	16.16	13.29
2	0.0514	0.32	6.23	18	1.4684	20.56	14.00
3	0.0698	0.48	6.88	19	1.8372	27.28	14.85
4	0.0850	0.64	7.53	20	2.2104	34.00	15.38
5	0.1116	0.84	7.53	21	2.7232	42.56	15.63
6	0.1268	1.04	8.20	22	3.3206	48.56	14.62
7	0.1678	1.40	8.34	23	4.0898	52.16	12.75
8	0.2074	1.84	8.87	24	5.0376	54.24	10.77
9	0.2496	2.28	9.13				
10	0.2878	2.84	9.87				
11	0.3630	3.60	9.92				
12	0.4358	4.52	10.37				
13	0.5282	5.88	11.13				
14	0.6662	7.64	11.47				
15	0.8218	9.92	12.07				
16	0.9852	12.40	12.59				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0200	0.00	0.00				
2	0.0400	0.10	2.50				
3	0.0500	0.10	2.00				
4	0.0800	0.20	2.50				
5	0.1000	0.20	2.00				
6	0.2000	1.00	5.00				
7	0.4000	3.40	8.50				
8	0.5000	4.80	9.60				
9	0.8000	8.80	11.00				
10	1.0000	11.90	11.90				
11	2.0000	29.60	14.80				

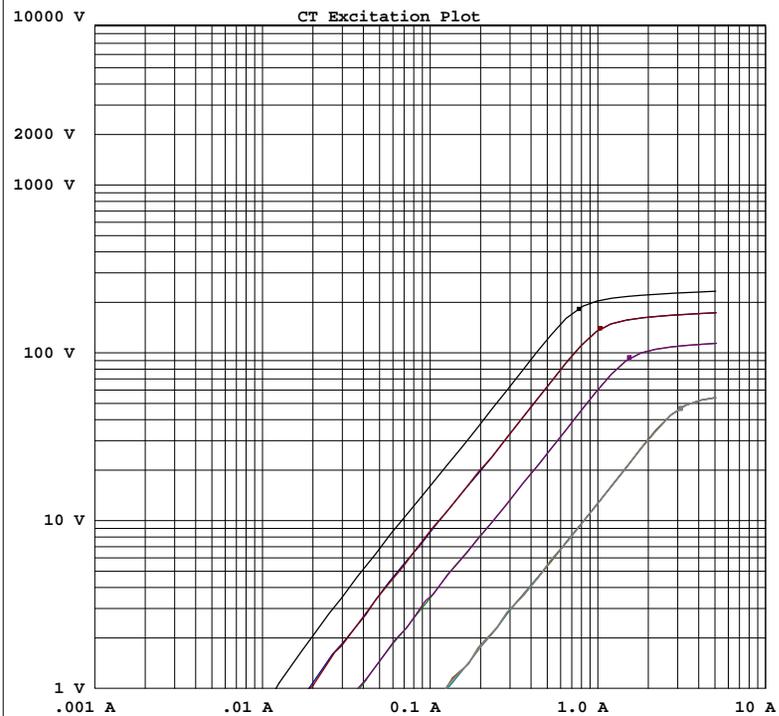
FILENAME: Piapot CTs HV (H1Y1) - Nove
 DATE: 11/25/20 13:17:49
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	46.36/3.1018	38.96/2.4876	0.00/0.0000	50/5.0	10.097	0.972 %	-0.10° [In Ø]	127.96 m-ohms
2	X1-X3	93.64/1.5438	76.52/1.2324	96.72/1.7068	100/5.0	20.059	0.297 %	0.20° [In Ø]	145.73 m-ohms
3	X1-X4	140.48/1.0322	112.44/0.8084	142.96/1.1136	150/5.0	30.058	0.194 %	0.30° [In Ø]	150.80 m-ohms
4	X1-X5	182.52/0.7722	151.00/0.6114	192.52/0.8472	200/5.0	40.060	0.150 %	0.32° [In Ø]	179.53 m-ohms
5	X2-X3	46.68/3.1314	38.72/2.4792	0.00/0.0000	50/5.0	10.113	1.128 %	0.00° [In Ø]	146.61 m-ohms
6	X2-X4	93.88/1.5430	77.04/1.2400	96.60/1.6982	100/5.0	20.069	0.344 %	0.24° [In Ø]	152.97 m-ohms
7	X2-X5	140.52/1.0312	112.68/0.8082	142.72/1.1088	150/5.0	30.053	0.175 %	0.28° [In Ø]	181.77 m-ohms
8	X3-X4	46.68/3.1378	39.24/2.5236	0.00/0.0000	50/5.0	10.081	0.814 %	-0.04° [In Ø]	109.47 m-ohms
10	X4-X5	46.56/3.1196	39.36/2.5320	0.00/0.0000	50/5.0	10.070	0.705 %	0.00° [In Ø]	89.22 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H1Y1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 13:17:49

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

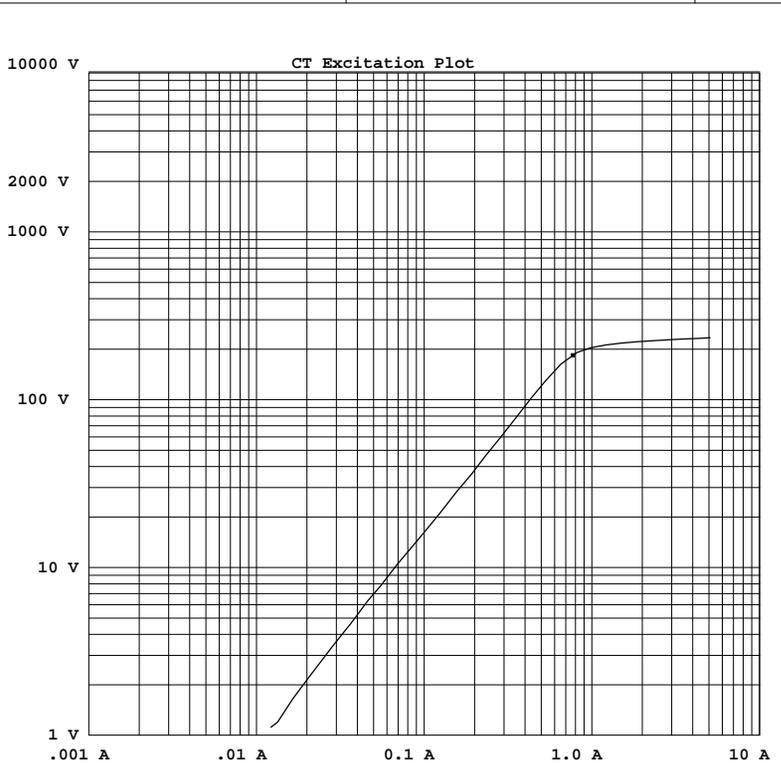
	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	
Burden Test	[]						
Insulation Test	[]						

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 97.500	Phase Angle:0.28°
Vkp[Volts]: 183.56	Vkp[Volts]: 152.28	Vkp[Volts]: 193.32	M-RATIO: 40.063	Ex I[Amps]: 0.418	In Phase
Ikp[Amps]: 0.7718	Ikp[Amps]: 0.6140	Ikp[Amps]: 0.8444	% ERROR: 0.1565	Winding Res: 192.08 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0122	1.12	91.80	17	0.2850	59.52	208.84
2	0.0134	1.20	89.55	18	0.3506	77.56	221.22
3	0.0164	1.64	100.00	19	0.4312	101.08	234.42
4	0.0204	2.20	107.84	20	0.5268	128.64	244.19
5	0.0282	3.36	119.15	21	0.6534	162.96	249.40
6	0.0324	4.00	123.46	22	0.8148	191.08	234.51
7	0.0368	4.68	127.17	23	0.9844	204.04	207.27
8	0.0460	6.32	137.39	24	1.2046	211.88	175.89
9	0.0554	7.84	141.52	25	1.4884	217.28	145.98
10	0.0684	10.32	150.88	26	1.8728	221.60	118.33
11	0.0858	13.48	157.11	27	2.2234	224.32	100.89
12	0.1026	16.68	162.57	28	2.7590	227.28	82.38
13	0.1252	21.28	169.97	29	3.3336	229.72	68.91
14	0.1568	28.36	180.87	30	4.1612	231.88	55.72
15	0.1922	36.20	188.35	31	5.0734	234.04	46.13
16	0.2328	46.36	199.14				

GRAPH POINTS

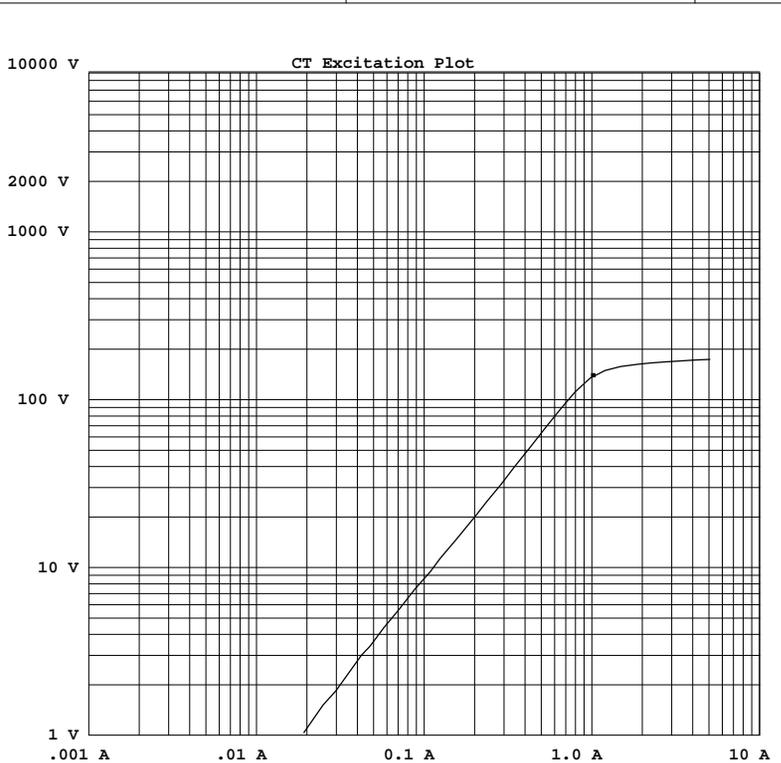
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	38.20	191.00
2	0.0020	0.20	100.00	13	0.4000	92.00	230.00
3	0.0040	0.40	100.00	14	0.5000	120.90	241.80
4	0.0050	0.40	80.00	15	0.8000	188.50	235.63
5	0.0080	0.70	87.50	16	1.0000	204.60	204.60
6	0.0100	0.90	90.00	17	2.0000	222.60	111.30
7	0.0200	2.20	110.00	18	4.0000	231.40	57.85
8	0.0400	5.20	130.00	19	5.0000	233.90	46.78
9	0.0500	7.00	140.00				
10	0.0800	12.40	155.00				
11	0.1000	16.20	162.00				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 93.200	Phase Angle:0.26°
Vkp[Volts]: 139.96	Vkp[Volts]: 114.20	Vkp[Volts]: 143.60	M-RATIO: 30.055	Ex I[Amps]: 0.679	In Phase
Ikp[Amps]: 1.0212	Ikp[Amps]: 0.8132	Ikp[Amps]: 1.1146	% ERROR: 0.1817	Winding Res: 163.46 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0192	1.04	54.17	17	0.5364	69.20	129.01
2	0.0250	1.52	60.80	18	0.6506	87.96	135.20
3	0.0298	1.84	61.74	19	0.7964	111.48	139.98
4	0.0422	3.00	71.09	20	0.9766	134.32	137.54
5	0.0476	3.40	71.43	21	1.1964	149.16	124.67
6	0.0574	4.36	75.96	22	1.4822	157.56	106.30
7	0.0706	5.60	79.32	23	1.8696	162.68	87.01
8	0.0886	7.48	84.42	24	2.2170	165.40	74.61
9	0.1088	9.44	86.76	25	2.7104	168.08	62.01
10	0.1252	11.40	91.05	26	3.3562	170.24	50.72
11	0.1564	14.80	94.63	27	4.1126	172.40	41.92
12	0.2044	20.52	100.39	28	5.0636	174.04	34.37
13	0.2378	24.92	104.79				
14	0.2886	31.48	109.08				
15	0.3494	40.32	115.40				
16	0.4296	52.24	121.60				

GRAPH POINTS

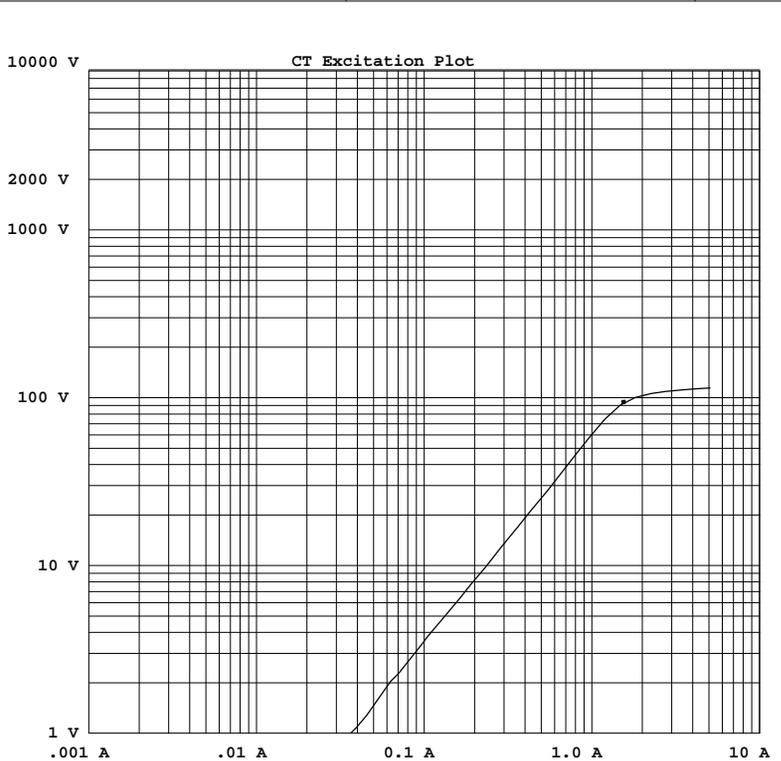
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.00	100.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.30	60.00	15	0.8000	111.90	139.88
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.60	60.00	17	2.0000	163.70	81.85
7	0.0200	1.10	55.00	18	4.0000	172.10	43.02
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.100	Phase Angle:0.22°
Vkp[Volts]: 94.16	Vkp[Volts]: 75.88	Vkp[Volts]: 96.80	M-RATIO: 20.064	Ex I[Amps]: 0.772	In Phase
Ikp[Amps]: 1.5474	Ikp[Amps]: 1.2158	Ikp[Amps]: 1.6972	% ERROR: 0.3190	Winding Res: 146.71 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0224	0.52	23.21	17	0.5408	27.68	51.18
2	0.0270	0.68	25.19	18	0.6476	34.92	53.92
3	0.0364	1.00	27.47	19	0.7976	45.60	57.17
4	0.0394	1.08	27.41	20	0.9766	58.76	60.17
5	0.0454	1.28	28.19	21	1.1956	74.44	62.26
6	0.0632	2.04	32.28	22	1.4782	90.28	61.07
7	0.0706	2.28	32.29	23	1.8176	100.40	55.24
8	0.0980	3.44	35.10	24	2.2592	105.92	46.88
9	0.1046	3.76	35.95	25	2.7558	108.92	39.52
10	0.1346	5.08	37.74	26	3.3952	111.20	32.75
11	0.1654	6.48	39.18	27	4.0932	112.84	27.57
12	0.1900	7.72	40.63	28	5.0702	114.44	22.57
13	0.2324	9.80	42.17				
14	0.2874	12.84	44.68				
15	0.3598	16.88	46.91				
16	0.4292	21.00	48.93				

GRAPH POINTS

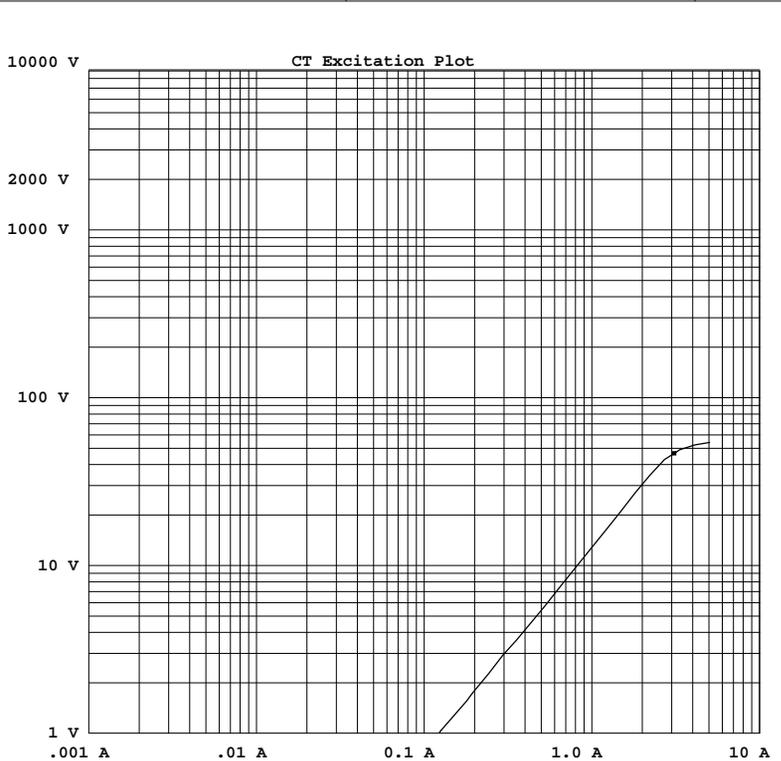
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.30	48.25
3	0.0040	0.10	25.00	14	0.5000	25.20	50.40
4	0.0050	0.10	20.00	15	0.8000	45.80	57.25
5	0.0080	0.20	25.00	16	1.0000	60.40	60.40
6	0.0100	0.20	20.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.30	22.86
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.50	35.00				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.300	Phase Angle:-0.22°
Vkp[Volts]: 46.64	Vkp[Volts]: 39.48	Vkp[Volts]: 0.00	M-RATIO: 10.108	Ex I[Amps]: 0.773	In Phase
Ikp[Amps]: 3.1072	Ikp[Amps]: 2.5172	Ikp[Amps]: 0.0000	% ERROR: 1.0770	Winding Res: 141.62 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0680	0.48	7.06	17	1.8144	27.08	14.93
2	0.0882	0.68	7.71	18	2.2170	34.44	15.53
3	0.1120	0.88	7.86	19	2.7136	42.76	15.76
4	0.1260	1.04	8.25	20	3.3498	49.00	14.63
5	0.1794	1.56	8.70	21	4.1060	52.28	12.73
6	0.1930	1.72	8.91	22	5.0376	54.20	10.76
7	0.2438	2.28	9.35				
8	0.2948	2.92	9.91				
9	0.3564	3.60	10.10				
10	0.4332	4.56	10.53				
11	0.5264	5.76	10.94				
12	0.6580	7.64	11.61				
13	0.7976	9.68	12.14				
14	0.9852	12.60	12.79				
15	1.2100	16.24	13.42				
16	1.4802	20.84	14.08				

GRAPH POINTS

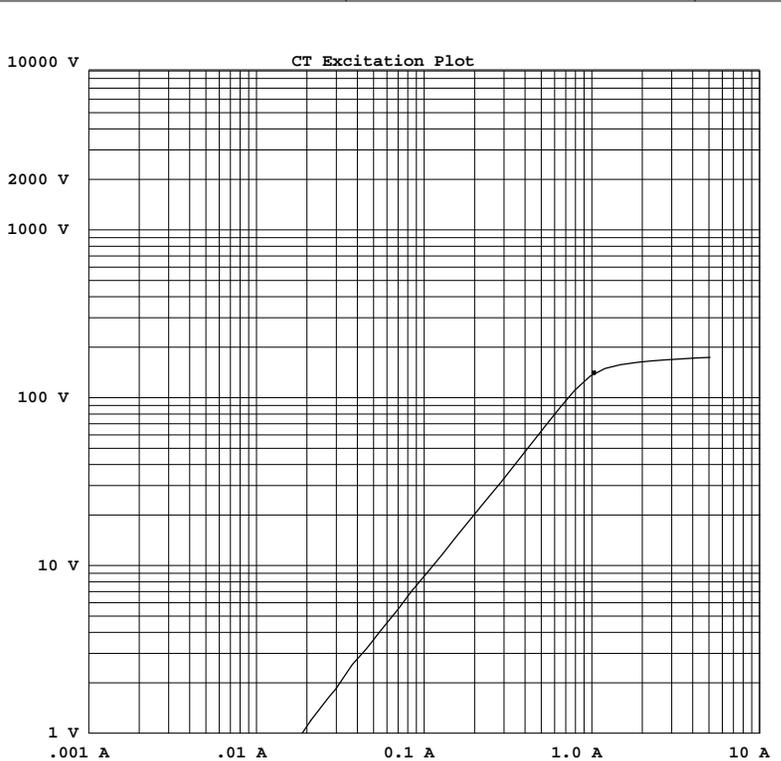
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.20	10.00	16	4.0000	51.80	12.95
6	0.0400	0.30	7.50	17	5.0000	54.10	10.82
7	0.0500	0.40	8.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.20	10.50				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.600	Phase Angle:0.22°
Vkp[Volts]: 140.88	Vkp[Volts]: 113.60	Vkp[Volts]: 143.32	M-RATIO: 30.059	Ex I[Amps]: 0.687	In Phase
Ikp[Amps]: 1.0286	Ikp[Amps]: 0.8096	Ikp[Amps]: 1.1090	% ERROR: 0.1970	Winding Res: 195.93 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0172	0.88	51.16	17	0.4358	53.16	121.98
2	0.0212	1.20	56.60	18	0.5380	69.44	129.07
3	0.0270	1.64	60.74	19	0.6492	87.84	135.30
4	0.0298	1.84	61.74	20	0.7930	110.92	139.87
5	0.0372	2.56	68.82	21	0.9770	134.32	137.48
6	0.0454	3.20	70.48	22	1.1988	149.44	124.66
7	0.0554	4.12	74.37	23	1.4798	157.28	106.28
8	0.0698	5.48	78.51	24	1.8760	162.68	86.72
9	0.0842	7.04	83.61	25	2.2266	165.40	74.28
10	0.1066	9.32	87.43	26	2.7136	168.08	61.94
11	0.1288	11.68	90.68	27	3.3660	170.24	50.58
12	0.1564	14.96	95.65	28	4.1320	172.40	41.72
13	0.2016	20.40	101.19	29	5.0734	174.04	34.30
14	0.2336	24.44	104.62				
15	0.2878	31.40	109.10				
16	0.3580	41.40	115.64				

GRAPH POINTS

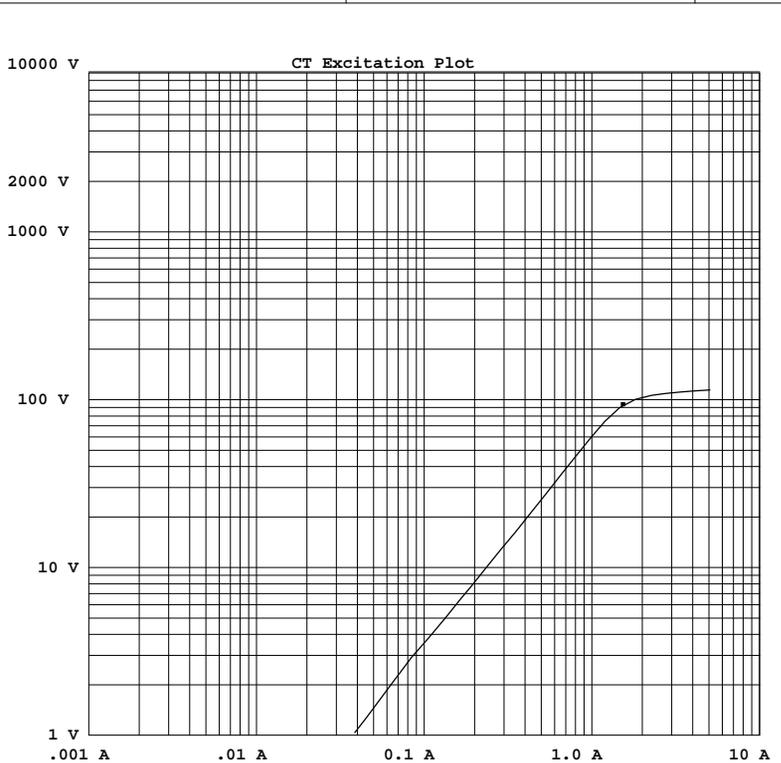
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.20	101.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.20	40.00	15	0.8000	111.80	139.75
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.50	50.00	17	2.0000	163.60	81.80
7	0.0200	1.10	55.00	18	4.0000	172.00	43.00
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
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MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.300	Phase Angle:0.18°
Vkp[Volts]: 93.92	Vkp[Volts]: 76.56	Vkp[Volts]: 96.60	M-RATIO: 20.072	Ex I[Amps]: 0.773	In Phase
Ikp[Amps]: 1.5370	Ikp[Amps]: 1.2278	Ikp[Amps]: 1.6910	% ERROR: 0.3620	Winding Res: 167.35 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0386	1.04	26.94	17	0.9980	60.32	60.44
2	0.0454	1.28	28.19	18	1.2002	74.60	62.16
3	0.0652	2.08	31.90	19	1.4658	89.84	61.29
4	0.0718	2.36	32.87	20	1.8210	100.52	55.20
5	0.0842	2.92	34.68	21	2.2722	106.08	46.69
6	0.1072	3.84	35.82	22	2.7590	108.92	39.48
7	0.1354	5.08	37.52	23	3.3822	111.08	32.84
8	0.1646	6.48	39.37	24	4.0834	112.84	27.63
9	0.1892	7.64	40.38	25	5.0604	114.32	22.59
10	0.2360	10.08	42.71				
11	0.2866	12.80	44.66				
12	0.3520	16.36	46.48				
13	0.4398	21.60	49.11				
14	0.5352	27.56	51.49				
15	0.6510	35.48	54.50				
16	0.7972	45.68	57.30				

GRAPH POINTS

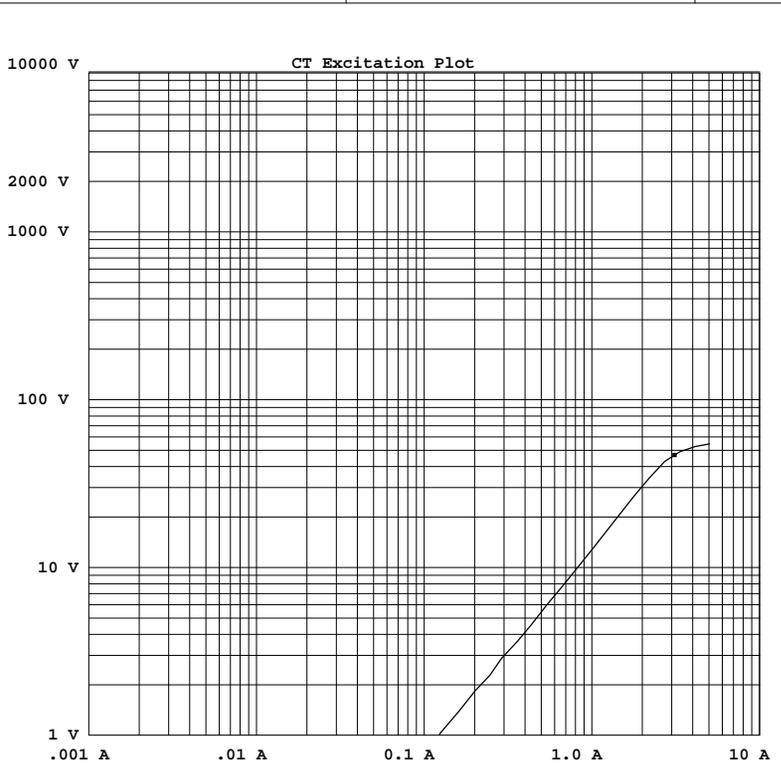
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.20	48.00
3	0.0040	0.10	25.00	14	0.5000	25.40	50.80
4	0.0050	0.10	20.00	15	0.8000	45.90	57.37
5	0.0080	0.20	25.00	16	1.0000	60.50	60.50
6	0.0100	0.30	30.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.20	22.84
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.60	36.00				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
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 STATION: Piapot
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 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.300	Phase Angle:-0.22°
Vkp[Volts]: 46.76	Vkp[Volts]: 39.60	Vkp[Volts]: 0.00	M-RATIO: 10.115	Ex I[Amps]: 0.774	In Phase
Ikp[Amps]: 3.1154	Ikp[Amps]: 2.5250	Ikp[Amps]: 0.0000	% ERROR: 1.1470	Winding Res: 149.52 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0566	0.36	6.36	17	1.4658	20.76	14.16
2	0.0788	0.56	7.11	18	1.8014	26.96	14.97
3	0.0944	0.72	7.63	19	2.2072	34.24	15.51
4	0.1096	0.84	7.66	20	2.7232	42.92	15.76
5	0.1256	1.04	8.28	21	3.3498	49.04	14.64
6	0.1622	1.40	8.63	22	4.1450	52.68	12.71
7	0.2012	1.84	9.15	23	5.0312	54.52	10.84
8	0.2468	2.28	9.24				
9	0.2898	2.88	9.94				
10	0.3610	3.64	10.08				
11	0.4328	4.52	10.44				
12	0.5430	6.04	11.12				
13	0.6666	7.72	11.58				
14	0.8172	9.92	12.14				
15	0.9840	12.48	12.68				
16	1.1932	15.96	13.38				

GRAPH POINTS

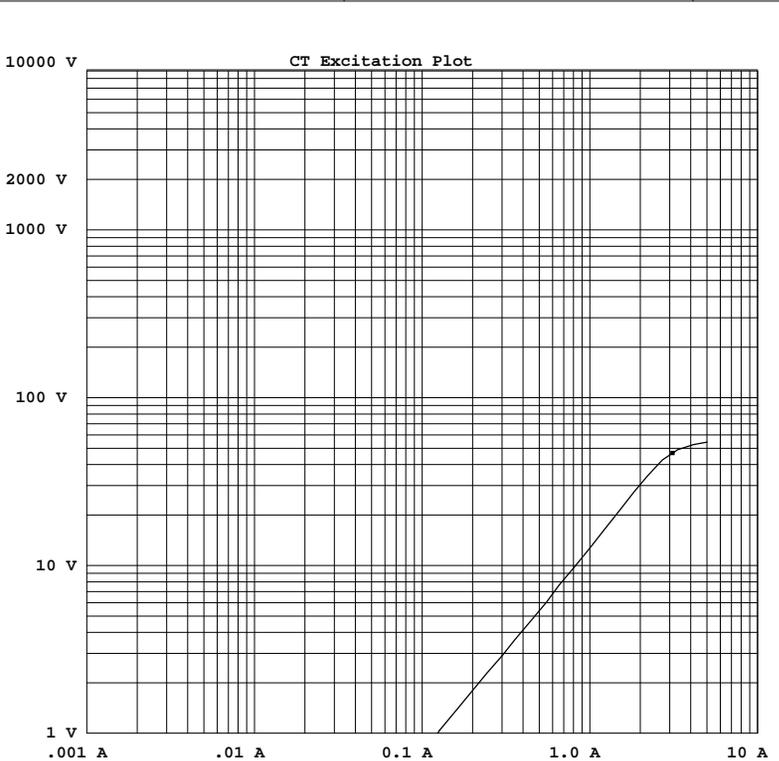
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.10	5.00	16	4.0000	52.00	13.00
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.16°
Vkp[Volts]: 46.76	Vkp[Volts]: 39.48	Vkp[Volts]: 0.00	M-RATIO: 10.089	Ex I[Amps]: 0.774	In Phase
Ikp[Amps]: 3.1198	Ikp[Amps]: 2.5236	Ikp[Amps]: 0.0000	% ERROR: 0.8870	Winding Res: 112.93 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0298	0.16	5.37	17	0.9972	12.64	12.68
2	0.0494	0.32	6.48	18	1.2190	16.32	13.39
3	0.0598	0.40	6.69	19	1.5078	21.32	14.14
4	0.0800	0.60	7.50	20	1.8306	27.36	14.95
5	0.0960	0.72	7.50	21	2.2040	34.12	15.48
6	0.1104	0.84	7.61	22	2.7136	42.64	15.71
7	0.1268	1.04	8.20	23	3.3400	49.00	14.67
8	0.1626	1.40	8.61	24	4.1450	52.56	12.68
9	0.2000	1.80	9.00	25	5.0052	54.40	10.87
10	0.2430	2.28	9.38				
11	0.3018	2.92	9.68				
12	0.3564	3.60	10.10				
13	0.4382	4.60	10.50				
14	0.5508	6.04	10.97				
15	0.6558	7.64	11.65				
16	0.8038	9.72	12.09				

GRAPH POINTS

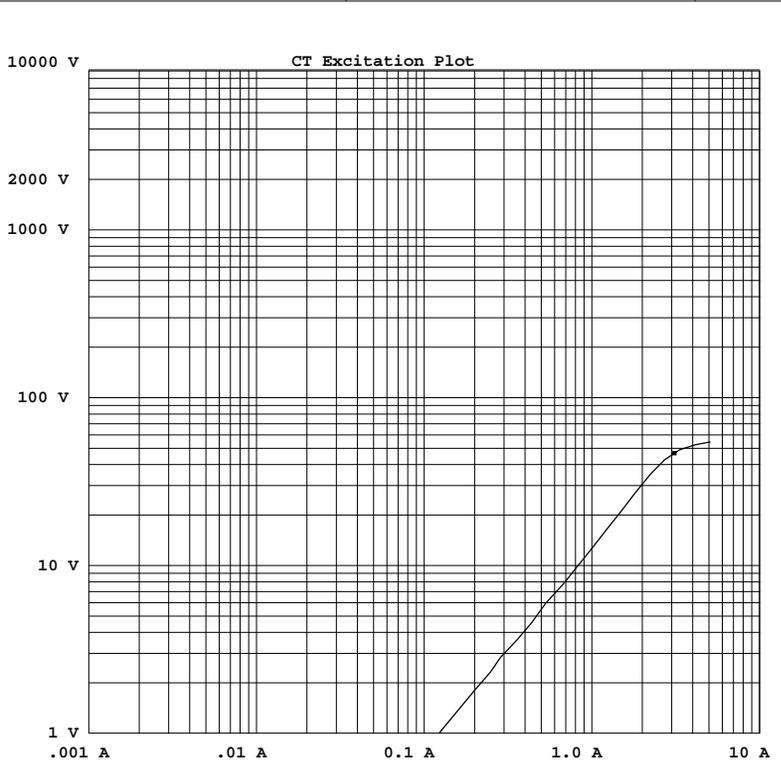
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.70	12.70
4	0.0100	0.00	0.00	15	2.0000	30.40	15.20
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H2X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.10°
Vkp[Volts]: 46.68	Vkp[Volts]: 39.20	Vkp[Volts]: 0.00	M-RATIO: 10.080	Ex I[Amps]: 0.771	In Phase
Ikp[Amps]: 3.1094	Ikp[Amps]: 2.4976	Ikp[Amps]: 0.0000	% ERROR: 0.7970	Winding Res: 102.05 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0298	0.16	5.37	17	0.8264	9.96	12.05
2	0.0418	0.28	6.70	18	0.9922	12.52	12.62
3	0.0508	0.32	6.30	19	1.2144	16.20	13.34
4	0.0554	0.36	6.50	20	1.5016	21.20	14.12
5	0.0796	0.60	7.54	21	1.8210	27.20	14.94
6	0.0952	0.72	7.56	22	2.2364	35.00	15.65
7	0.1092	0.84	7.69	23	2.7104	42.64	15.73
8	0.1264	1.04	8.23	24	3.3302	48.92	14.69
9	0.1622	1.40	8.63	25	4.1320	52.48	12.70
10	0.1996	1.80	9.02	26	5.0702	54.52	10.75
11	0.2488	2.32	9.32				
12	0.2858	2.84	9.94				
13	0.3576	3.60	10.07				
14	0.4370	4.56	10.43				
15	0.5318	5.96	11.21				
16	0.6728	7.72	11.47				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.50	11.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	12.60	12.60
4	0.0100	0.00	0.00	15	2.0000	30.60	15.30
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.30	7.50	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H2X1) - Nove

MFR: Siemens

SUMMARY REPORT

DATE: 11/25/20 14:38:11

MODEL:

KNEE TYPE: IEEE 30 Deg

COMPANY: TCE

SN:

FREQUENCY: 60 Hz

STATION: Piapot

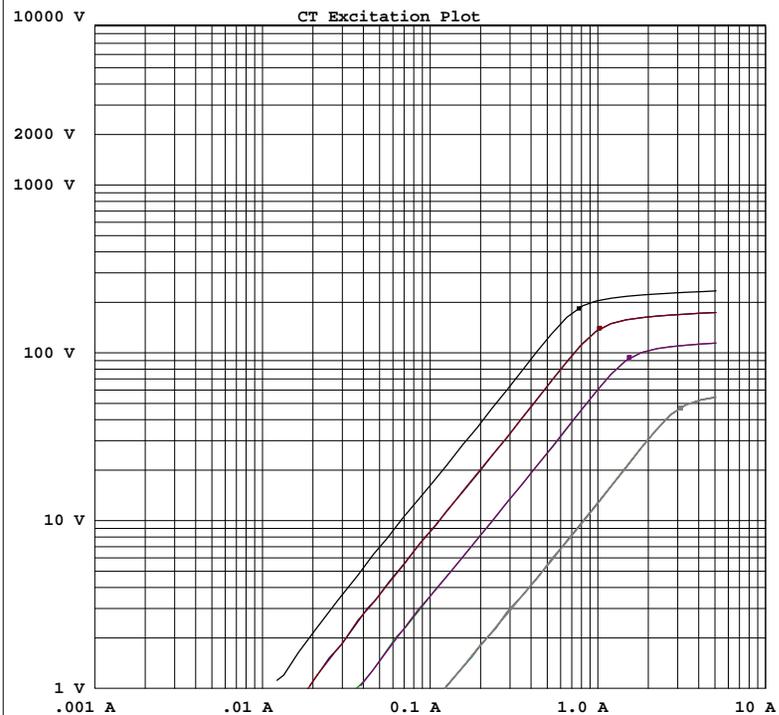
OPERATOR: JR

CIRCUIT:

COMMENTS:

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	46.64/3.1072	39.48/2.5172	0.00/0.0000	50/5.0	10.108	1.077 %	-0.22° [In Ø]	141.62 m-ohms
2	X1-X3	94.16/1.5474	75.88/1.2158	96.80/1.6972	100/5.0	20.064	0.319 %	0.22° [In Ø]	146.71 m-ohms
3	X1-X4	139.96/1.0212	114.20/0.8132	143.60/1.1146	150/5.0	30.055	0.182 %	0.26° [In Ø]	163.46 m-ohms
4	X1-X5	183.56/0.7718	152.28/0.6140	193.32/0.8444	200/5.0	40.063	0.157 %	0.28° [In Ø]	192.08 m-ohms
5	X2-X3	46.76/3.1154	39.60/2.5250	0.00/0.0000	50/5.0	10.115	1.147 %	-0.22° [In Ø]	149.52 m-ohms
6	X2-X4	93.92/1.5370	76.56/1.2278	96.60/1.6910	100/5.0	20.072	0.362 %	0.18° [In Ø]	167.35 m-ohms
7	X2-X5	140.88/1.0286	113.60/0.8096	143.32/1.1090	150/5.0	30.059	0.197 %	0.22° [In Ø]	195.93 m-ohms
8	X3-X4	46.76/3.1198	39.48/2.5236	0.00/0.0000	50/5.0	10.089	0.887 %	-0.16° [In Ø]	112.93 m-ohms
10	X4-X5	46.68/3.1094	39.20/2.4976	0.00/0.0000	50/5.0	10.080	0.797 %	-0.10° [In Ø]	102.05 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H2X1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 14:38:11

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

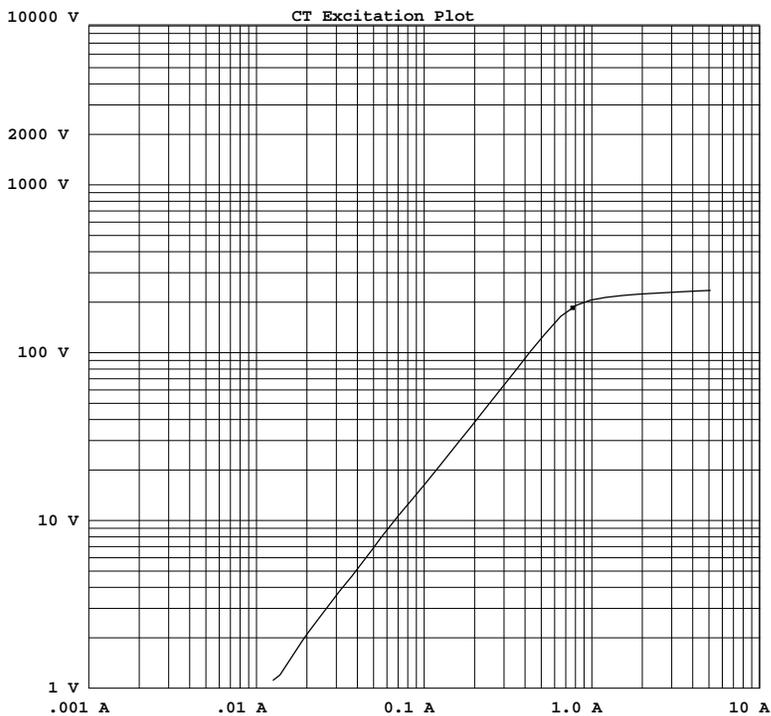
	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	
Burden Test	[]						
Insulation Test	[]						

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 97.800	Phase Angle:0.22°
Vkp[Volts]: 184.88	Vkp[Volts]: 154.08	Vkp[Volts]: 194.04	M-RATIO: 40.066	Ex I[Amps]: 0.415	In Phase
Ikp[Amps]: 0.7680	Ikp[Amps]: 0.6150	Ikp[Amps]: 0.8336	% ERROR: 0.1660	Winding Res: 189.74 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0126	1.12	88.89	17	0.2878	61.00	211.95
2	0.0138	1.20	86.96	18	0.3506	78.24	223.16
3	0.0188	1.92	102.13	19	0.4336	102.84	237.18
4	0.0204	2.16	105.88	20	0.5264	129.60	246.20
5	0.0254	2.88	113.39	21	0.6530	164.60	252.07
6	0.0316	3.84	121.52	22	0.8094	192.16	237.41
7	0.0372	4.68	125.81	23	0.9848	205.92	209.10
8	0.0484	6.60	136.36	24	1.2084	213.48	176.66
9	0.0558	8.00	143.37	25	1.5196	219.16	144.22
10	0.0706	10.76	152.41	26	1.8794	222.96	118.63
11	0.0836	13.16	157.42	27	2.2494	225.64	100.31
12	0.1022	16.68	163.21	28	2.7590	228.36	82.77
13	0.1252	21.44	171.25	29	3.3498	230.52	68.82
14	0.1592	29.04	182.41	30	4.1776	232.96	55.76
15	0.1904	36.16	189.92	31	5.0896	235.12	46.20
16	0.2332	46.76	200.51				

GRAPH POINTS

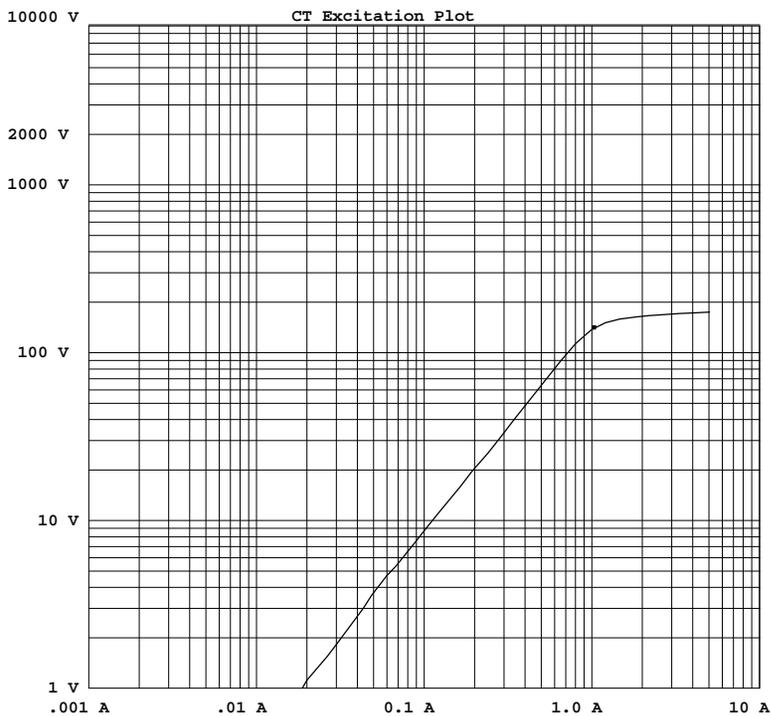
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	38.20	191.00
2	0.0020	0.20	100.00	13	0.4000	92.00	230.00
3	0.0040	0.40	100.00	14	0.5000	120.90	241.80
4	0.0050	0.40	80.00	15	0.8000	188.50	235.63
5	0.0080	0.70	87.50	16	1.0000	204.60	204.60
6	0.0100	0.90	90.00	17	2.0000	222.60	111.30
7	0.0200	2.20	110.00	18	4.0000	231.40	57.85
8	0.0400	5.20	130.00	19	5.0000	233.90	46.78
9	0.0500	7.00	140.00				
10	0.0800	12.40	155.00				
11	0.1000	16.20	162.00				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 95.600	Phase Angle:0.28°
Vkp[Volts]: 141.52	Vkp[Volts]: 113.92	Vkp[Volts]: 145.20	M-RATIO: 30.049	Ex I[Amps]: 0.687	In Phase
Ikp[Amps]: 1.0294	Ikp[Amps]: 0.8050	Ikp[Amps]: 1.1164	% ERROR: 0.1640	Winding Res: 160.65 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0160	0.76	47.50	17	0.4344	53.64	123.48
2	0.0200	1.12	56.00	18	0.5330	69.20	129.83
3	0.0266	1.56	58.65	19	0.6522	89.32	136.95
4	0.0302	1.84	60.93	20	0.8050	113.92	141.52
5	0.0434	3.00	69.12	21	0.9940	137.16	137.99
6	0.0488	3.60	73.77	22	1.2058	151.08	125.29
7	0.0598	4.68	78.26	23	1.4680	158.64	108.07
8	0.0680	5.36	78.82	24	1.8566	163.76	88.20
9	0.0886	7.44	83.97	25	2.2072	166.48	75.43
10	0.1038	9.12	87.86	26	2.7784	169.16	60.88
11	0.1268	11.64	91.80	27	3.3466	171.32	51.19
12	0.1650	16.00	96.97	28	4.1060	172.96	42.12
13	0.1930	19.64	101.76	29	5.0410	174.84	34.68
14	0.2402	25.24	105.08				
15	0.2854	31.40	110.02				
16	0.3502	40.88	116.73				

GRAPH POINTS

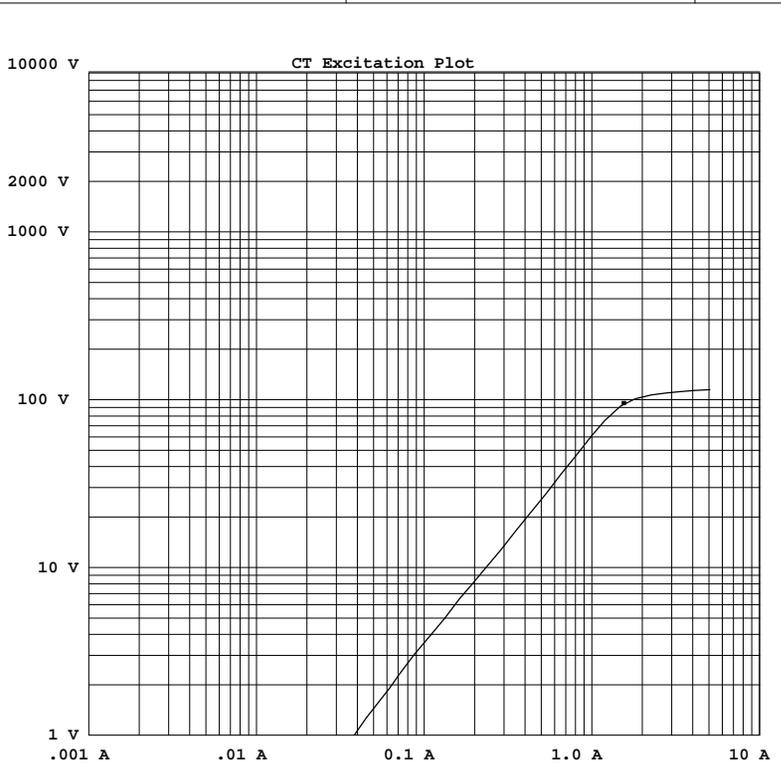
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.00	100.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.30	60.00	15	0.8000	111.90	139.88
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.60	60.00	17	2.0000	163.70	81.85
7	0.0200	1.10	55.00	18	4.0000	172.10	43.02
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.200	Phase Angle:0.18°
Vkp[Volts]: 95.36	Vkp[Volts]: 76.80	Vkp[Volts]: 97.08	M-RATIO: 20.061	Ex I[Amps]: 0.766	In Phase
Ikp[Amps]: 1.5516	Ikp[Amps]: 1.2188	Ikp[Amps]: 1.6684	% ERROR: 0.3035	Winding Res: 144.15 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0208	0.44	21.15	17	0.6518	35.88	55.05
2	0.0282	0.72	25.53	18	0.7980	45.88	57.49
3	0.0372	0.96	25.81	19	0.9952	60.68	60.97
4	0.0454	1.28	28.19	20	1.1956	75.12	62.83
5	0.0624	1.92	30.77	21	1.4880	91.76	61.67
6	0.0714	2.32	32.49	22	1.8080	101.20	55.97
7	0.0874	3.04	34.78	23	2.2722	106.88	47.04
8	0.1076	3.88	36.06	24	2.7914	109.84	39.35
9	0.1330	5.00	37.59	25	3.3270	111.60	33.54
10	0.1618	6.48	40.05	26	4.1190	113.52	27.56
11	0.1908	7.84	41.09	27	5.0636	115.00	22.71
12	0.2364	10.12	42.81				
13	0.2858	12.68	44.37				
14	0.3516	16.52	46.99				
15	0.4414	21.84	49.48				
16	0.5372	27.76	51.68				

GRAPH POINTS

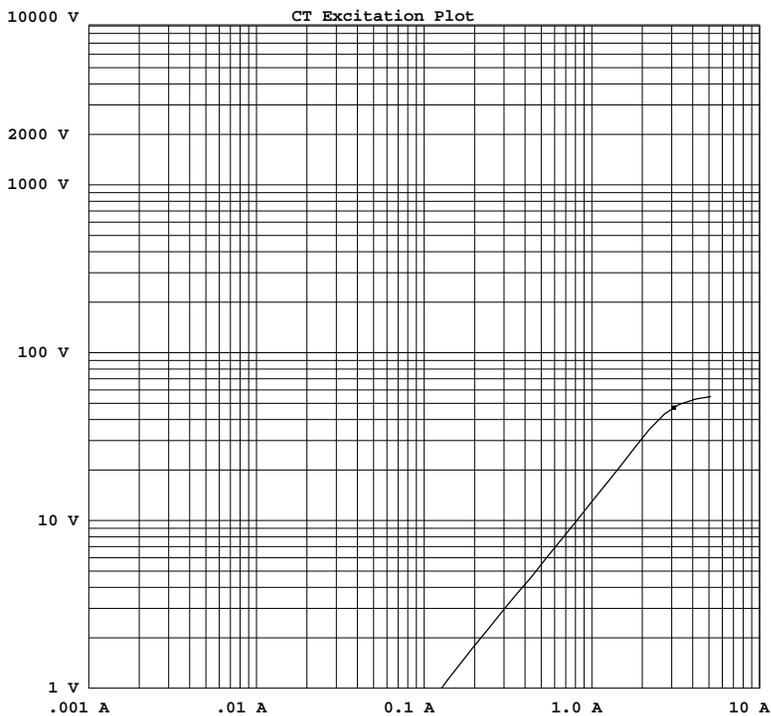
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.30	48.25
3	0.0040	0.10	25.00	14	0.5000	25.20	50.40
4	0.0050	0.10	20.00	15	0.8000	45.80	57.25
5	0.0080	0.20	25.00	16	1.0000	60.40	60.40
6	0.0100	0.20	20.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.30	22.86
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.50	35.00				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.22°
Vkp[Volts]: 47.00	Vkp[Volts]: 39.36	Vkp[Volts]: 0.00	M-RATIO: 10.106	Ex I[Amps]: 0.778	In Phase
Ikp[Amps]: 3.0926	Ikp[Amps]: 2.4770	Ikp[Amps]: 0.0000	% ERROR: 1.0560	Winding Res: 138.25 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0652	0.44	6.75	17	1.4712	20.92	14.22
2	0.0694	0.48	6.92	18	1.8046	27.20	15.07
3	0.0866	0.64	7.39	19	2.2104	35.08	15.87
4	0.1038	0.76	7.32	20	2.7266	43.36	15.90
5	0.1376	1.12	8.14	21	3.3206	49.24	14.83
6	0.1752	1.52	8.68	22	4.1808	52.96	12.67
7	0.1930	1.72	8.91	23	5.1058	54.72	10.72
8	0.2398	2.24	9.34				
9	0.2964	2.92	9.85				
10	0.3552	3.64	10.25				
11	0.4324	4.56	10.55				
12	0.5372	6.00	11.17				
13	0.6592	7.72	11.71				
14	0.7968	9.76	12.25				
15	0.9774	12.60	12.89				
16	1.2006	16.24	13.53				

GRAPH POINTS

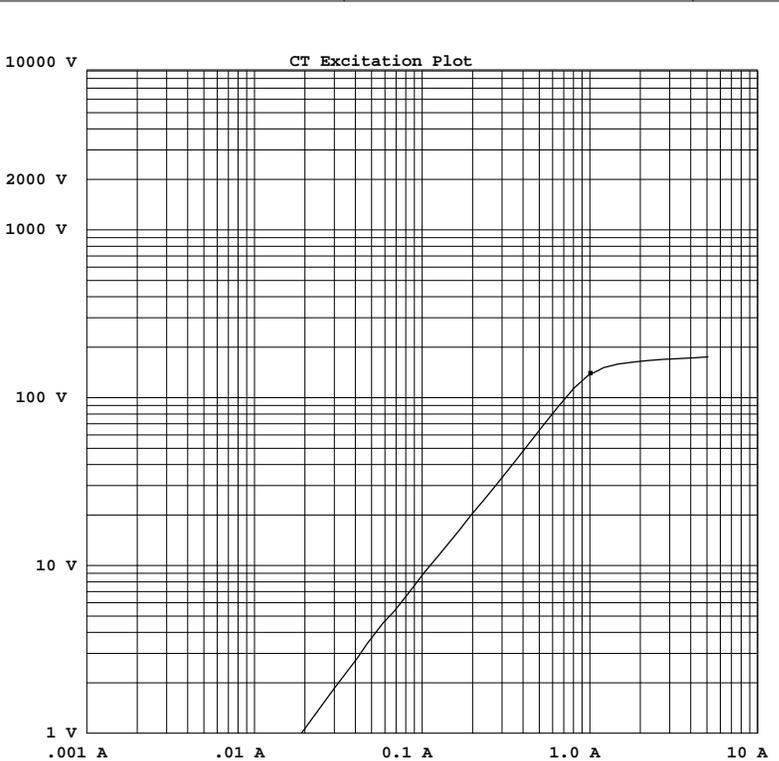
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.20	10.00	16	4.0000	51.80	12.95
6	0.0400	0.30	7.50	17	5.0000	54.10	10.82
7	0.0500	0.40	8.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.20	10.50				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 92.700	Phase Angle:0.24°
Vkp[Volts]: 140.08	Vkp[Volts]: 115.88	Vkp[Volts]: 144.36	M-RATIO: 30.052	Ex I[Amps]: 0.670	In Phase
Ikp[Amps]: 1.0102	Ikp[Amps]: 0.8168	Ikp[Amps]: 1.1080	% ERROR: 0.1717	Winding Res: 192.30 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0168	0.84	50.00	17	0.5338	69.44	130.09
2	0.0254	1.48	58.27	18	0.6464	88.12	136.32
3	0.0298	1.84	61.74	19	0.8054	114.04	141.59
4	0.0414	2.84	68.60	20	0.9734	135.40	139.10
5	0.0468	3.40	72.65	21	1.2124	151.36	124.84
6	0.0586	4.56	77.82	22	1.4704	158.64	107.89
7	0.0680	5.32	78.24	23	1.8664	163.76	87.74
8	0.0890	7.48	84.04	24	2.2170	166.48	75.09
9	0.1022	9.00	88.06	25	2.7882	169.44	60.77
10	0.1256	11.52	91.72	26	3.3530	171.08	51.02
11	0.1638	15.88	96.95	27	4.1158	172.96	42.02
12	0.1950	19.88	101.95	28	5.0670	175.12	34.56
13	0.2328	24.48	105.15				
14	0.2850	31.40	110.18				
15	0.3568	41.60	116.59				
16	0.4324	53.16	122.94				

GRAPH POINTS

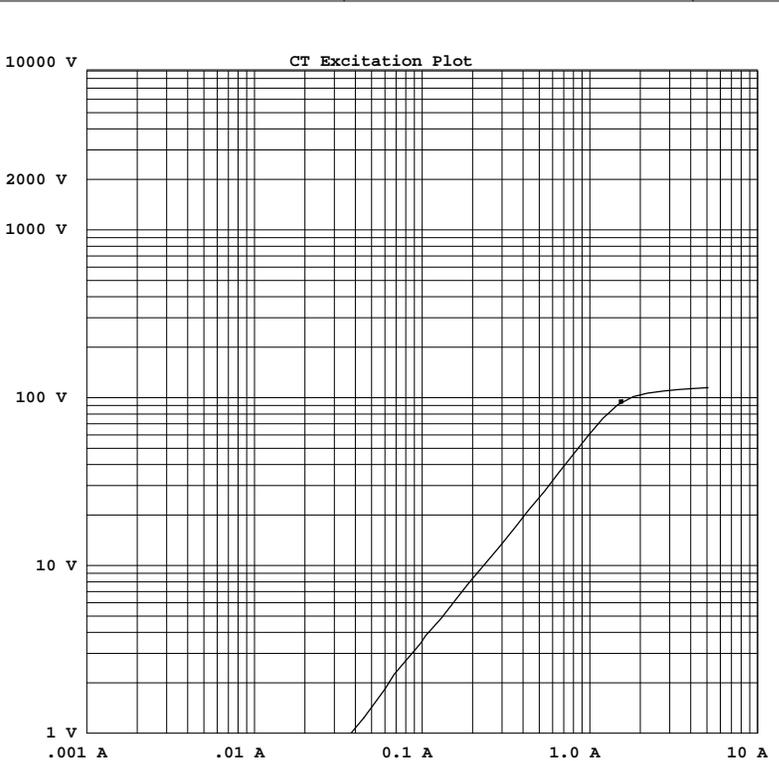
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.20	101.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.20	40.00	15	0.8000	111.80	139.75
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.50	50.00	17	2.0000	163.60	81.80
7	0.0200	1.10	55.00	18	4.0000	172.00	43.00
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.200	Phase Angle:0.20°
Vkp[Volts]: 94.72	Vkp[Volts]: 77.24	Vkp[Volts]: 97.00	M-RATIO: 20.062	Ex I[Amps]: 0.767	In Phase
Ikp[Amps]: 1.5346	Ikp[Amps]: 1.2234	Ikp[Amps]: 1.6710	% ERROR: 0.3115	Winding Res: 163.23 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0348	0.92	26.44	17	0.7984	46.00	57.62
2	0.0376	1.00	26.60	18	0.9784	59.52	60.83
3	0.0450	1.24	27.56	19	1.1980	75.40	62.94
4	0.0602	1.84	30.56	20	1.4662	90.80	61.93
5	0.0680	2.24	32.94	21	1.8144	101.36	55.86
6	0.0980	3.44	35.10	22	2.2040	106.36	48.26
7	0.1046	3.80	36.33	23	2.7720	109.72	39.58
8	0.1306	4.88	37.37	24	3.3790	111.88	33.11
9	0.1592	6.28	39.45	25	4.0866	113.36	27.74
10	0.1900	7.88	41.47	26	5.0702	114.84	22.65
11	0.2344	10.08	43.00				
12	0.2908	13.00	44.70				
13	0.3646	17.24	47.28				
14	0.4320	21.40	49.54				
15	0.5368	27.72	51.64				
16	0.6460	35.20	54.49				

GRAPH POINTS

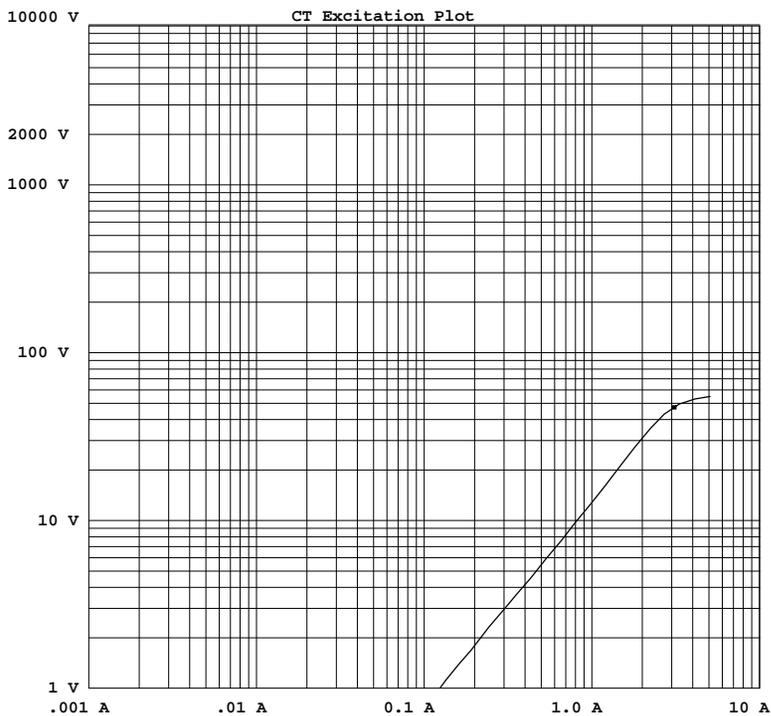
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.20	48.00
3	0.0040	0.10	25.00	14	0.5000	25.40	50.80
4	0.0050	0.10	20.00	15	0.8000	45.90	57.37
5	0.0080	0.20	25.00	16	1.0000	60.50	60.50
6	0.0100	0.30	30.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.20	22.84
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.60	36.00				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.16°
Vkp[Volts]: 47.20	Vkp[Volts]: 39.76	Vkp[Volts]: 0.00	M-RATIO: 10.108	Ex I[Amps]: 0.772	In Phase
Ikp[Amps]: 3.1082	Ikp[Amps]: 2.5016	Ikp[Amps]: 0.0000	% ERROR: 1.0760	Winding Res: 142.87 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0554	0.36	6.50	17	1.4688	20.96	14.27
2	0.0694	0.48	6.92	18	1.7982	27.20	15.13
3	0.0846	0.60	7.09	19	2.2332	35.32	15.82
4	0.1096	0.84	7.66	20	2.7070	43.12	15.93
5	0.1346	1.12	8.32	21	3.3238	49.40	14.86
6	0.1618	1.40	8.65	22	4.1158	53.04	12.89
7	0.1900	1.68	8.84	23	5.0702	54.92	10.83
8	0.2438	2.32	9.52				
9	0.2964	2.92	9.85				
10	0.3598	3.68	10.23				
11	0.4336	4.56	10.52				
12	0.5342	5.92	11.08				
13	0.6616	7.64	11.55				
14	0.7934	9.68	12.20				
15	0.9866	12.56	12.73				
16	1.2042	16.20	13.45				

GRAPH POINTS

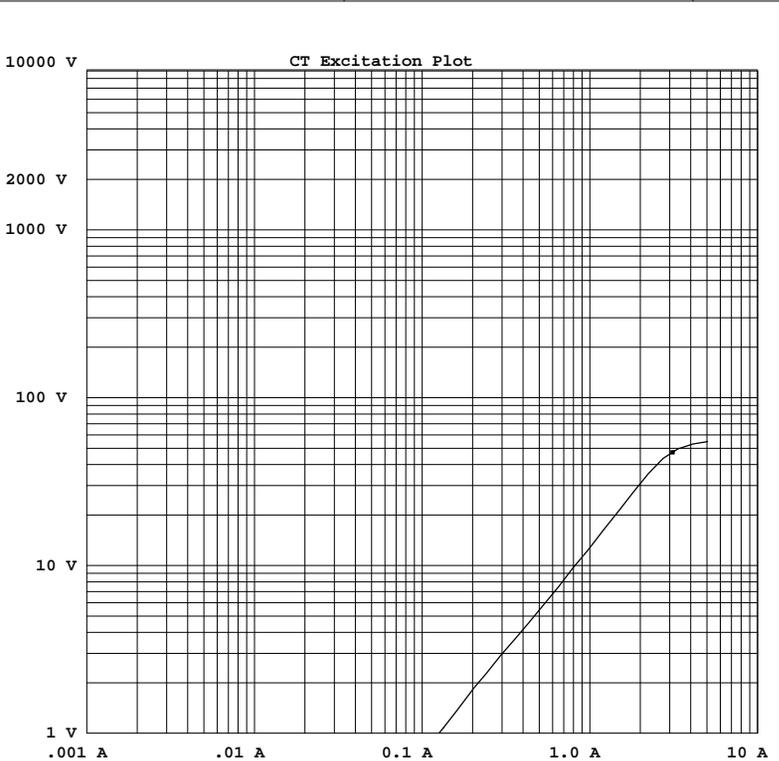
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.10	5.00	16	4.0000	52.00	13.00
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.08°
Vkp[Volts]: 47.24	Vkp[Volts]: 39.76	Vkp[Volts]: 0.00	M-RATIO: 10.083	Ex I[Amps]: 0.778	In Phase
Ikp[Amps]: 3.1192	Ikp[Amps]: 2.5108	Ikp[Amps]: 0.0000	% ERROR: 0.8320	Winding Res: 106.10 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0290	0.16	5.52	17	0.7948	9.68	12.18
2	0.0368	0.20	5.43	18	0.9800	12.44	12.69
3	0.0508	0.32	6.30	19	1.2144	16.40	13.50
4	0.0566	0.36	6.36	20	1.4966	21.32	14.25
5	0.0684	0.48	7.02	21	1.8144	27.28	15.04
6	0.0850	0.60	7.06	22	2.2300	35.20	15.78
7	0.1092	0.84	7.69	23	2.7428	43.52	15.87
8	0.1342	1.08	8.05	24	3.3498	49.52	14.78
9	0.1606	1.36	8.47	25	4.1224	52.96	12.85
10	0.2048	1.88	9.18	26	5.0344	54.80	10.89
11	0.2422	2.28	9.41				
12	0.2944	2.92	9.92				
13	0.3642	3.72	10.21				
14	0.4324	4.56	10.55				
15	0.5372	5.92	11.02				
16	0.6566	7.56	11.51				

GRAPH POINTS

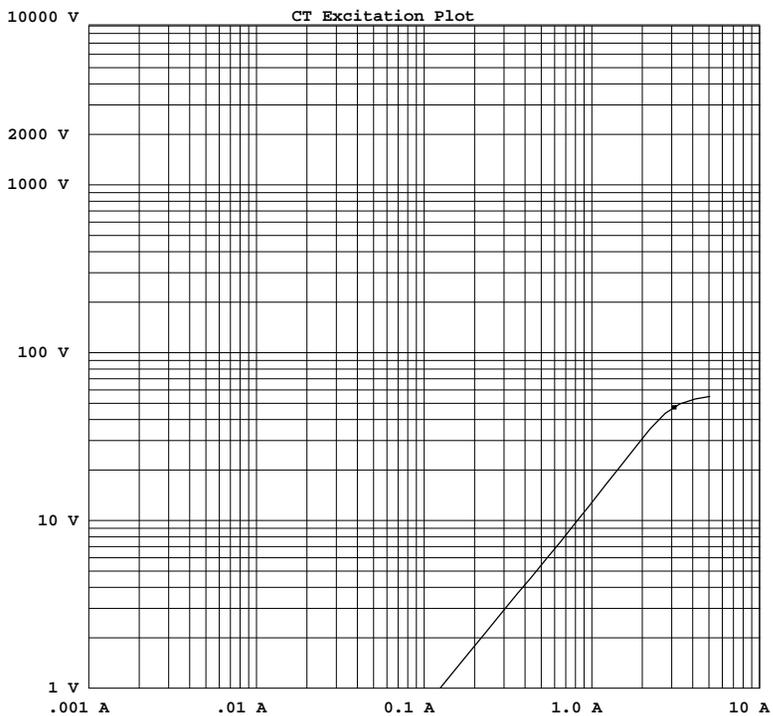
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.70	12.70
4	0.0100	0.00	0.00	15	2.0000	30.40	15.20
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.02°
Vkp[Volts]: 47.20	Vkp[Volts]: 39.68	Vkp[Volts]: 0.00	M-RATIO: 10.077	Ex I[Amps]: 0.779	In Phase
Ikp[Amps]: 3.1134	Ikp[Amps]: 2.5038	Ikp[Amps]: 0.0000	% ERROR: 0.7730	Winding Res: 98.70 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0332	0.16	4.82	17	0.8168	9.96	12.19
2	0.0398	0.24	6.03	18	0.9718	12.32	12.68
3	0.0492	0.32	6.50	19	1.2140	16.40	13.51
4	0.0578	0.36	6.23	20	1.4946	21.28	14.24
5	0.0730	0.52	7.12	21	1.8210	27.32	15.00
6	0.0874	0.64	7.32	22	2.2202	35.08	15.80
7	0.1038	0.80	7.71	23	2.7396	43.52	15.89
8	0.1362	1.12	8.22	24	3.3498	49.52	14.78
9	0.1560	1.32	8.46	25	4.1354	53.04	12.83
10	0.1900	1.68	8.84	26	5.0474	54.88	10.87
11	0.2336	2.16	9.25				
12	0.2986	2.92	9.78				
13	0.3610	3.68	10.19				
14	0.4340	4.56	10.51				
15	0.5400	5.96	11.04				
16	0.6572	7.56	11.50				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.50	11.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	12.60	12.60
4	0.0100	0.00	0.00	15	2.0000	30.60	15.30
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.30	7.50	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

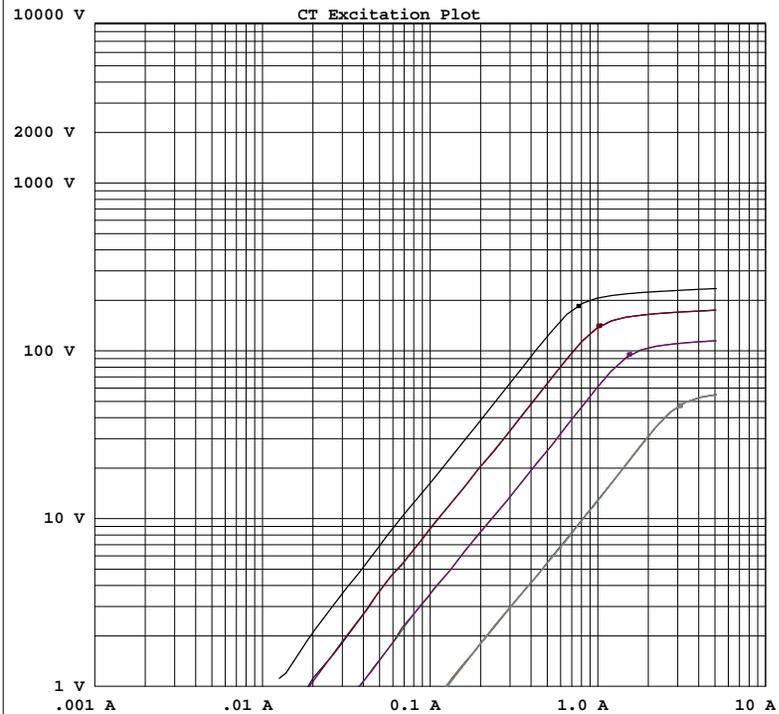
FILENAME: Piapot CTs HV (H2Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	47.00/3.0926	39.36/2.4770	0.00/0.0000	50/5.0	10.106	1.056 %	-0.22° [In Ø]	138.25 m-ohms
2	X1-X3	95.36/1.5516	76.80/1.2188	97.08/1.6684	100/5.0	20.061	0.304 %	0.18° [In Ø]	144.15 m-ohms
3	X1-X4	141.52/1.0294	113.92/0.8050	145.20/1.1164	150/5.0	30.049	0.164 %	0.28° [In Ø]	160.65 m-ohms
4	X1-X5	184.88/0.7680	154.08/0.6150	194.04/0.8336	200/5.0	40.066	0.166 %	0.22° [In Ø]	189.74 m-ohms
5	X2-X3	47.20/3.1082	39.76/2.5016	0.00/0.0000	50/5.0	10.108	1.076 %	-0.16° [In Ø]	142.87 m-ohms
6	X2-X4	94.72/1.5346	77.24/1.2234	97.00/1.6710	100/5.0	20.062	0.312 %	0.20° [In Ø]	163.23 m-ohms
7	X2-X5	140.08/1.0102	115.88/0.8168	144.36/1.1080	150/5.0	30.052	0.172 %	0.24° [In Ø]	192.30 m-ohms
8	X3-X4	47.24/3.1192	39.76/2.5108	0.00/0.0000	50/5.0	10.083	0.832 %	-0.08° [In Ø]	106.10 m-ohms
10	X4-X5	47.20/3.1134	39.68/2.5038	0.00/0.0000	50/5.0	10.077	0.773 %	-0.02° [In Ø]	98.70 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H2Y1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 14:38:11

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	

Burden Test []

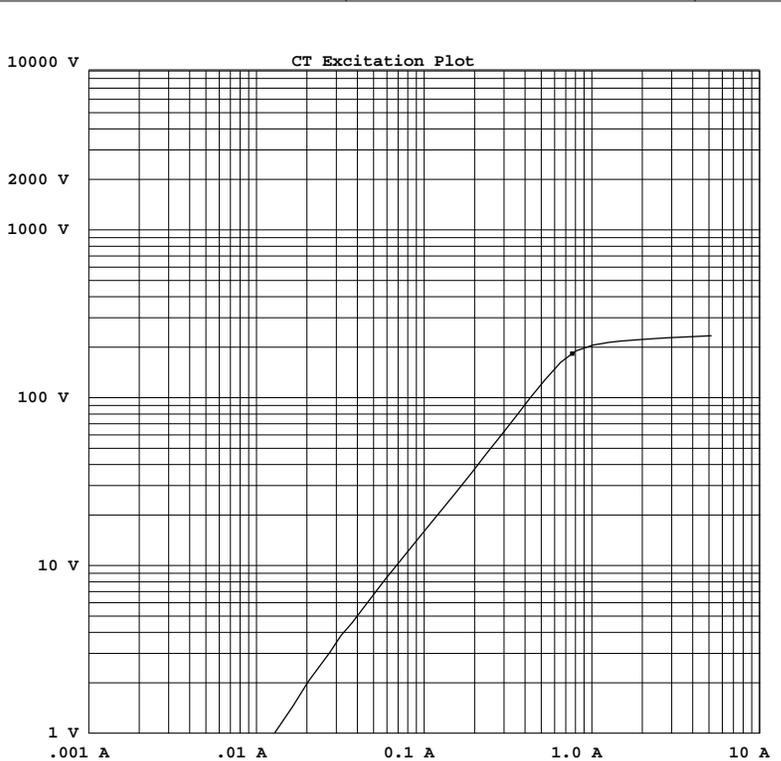
Insulation Test []

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 97.400	Phase Angle:0.24°
Vkp[Volts]: 183.12	Vkp[Volts]: 153.56	Vkp[Volts]: 191.60	M-RATIO: 40.063	Ex I[Amps]: 0.420	In Phase
Ikp[Amps]: 0.7646	Ikp[Amps]: 0.6198	Ikp[Amps]: 0.8254	% ERROR: 0.1577	Winding Res: 201.16 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0114	0.84	73.68	17	0.3544	77.84	219.64
2	0.0164	1.44	87.80	18	0.4320	100.52	232.69
3	0.0204	2.04	100.00	19	0.5278	128.36	243.20
4	0.0274	3.04	110.95	20	0.6530	162.68	249.13
5	0.0320	3.84	120.00	21	0.8008	189.72	236.91
6	0.0372	4.56	122.58	22	1.0132	205.92	203.24
7	0.0468	6.16	131.62	23	1.2580	213.48	169.70
8	0.0586	8.28	141.30	24	1.4740	217.28	147.41
9	0.0690	10.12	146.67	25	1.8404	221.32	120.26
10	0.0862	13.32	154.52	26	2.2948	224.84	97.98
11	0.1022	16.40	160.47	27	2.8142	227.56	80.86
12	0.1260	21.20	168.25	28	3.3984	229.72	67.60
13	0.1548	27.28	176.23	29	4.1158	231.88	56.34
14	0.1946	36.28	186.43	30	5.1480	234.04	45.46
15	0.2332	45.88	196.74				
16	0.2854	59.12	207.15				

GRAPH POINTS

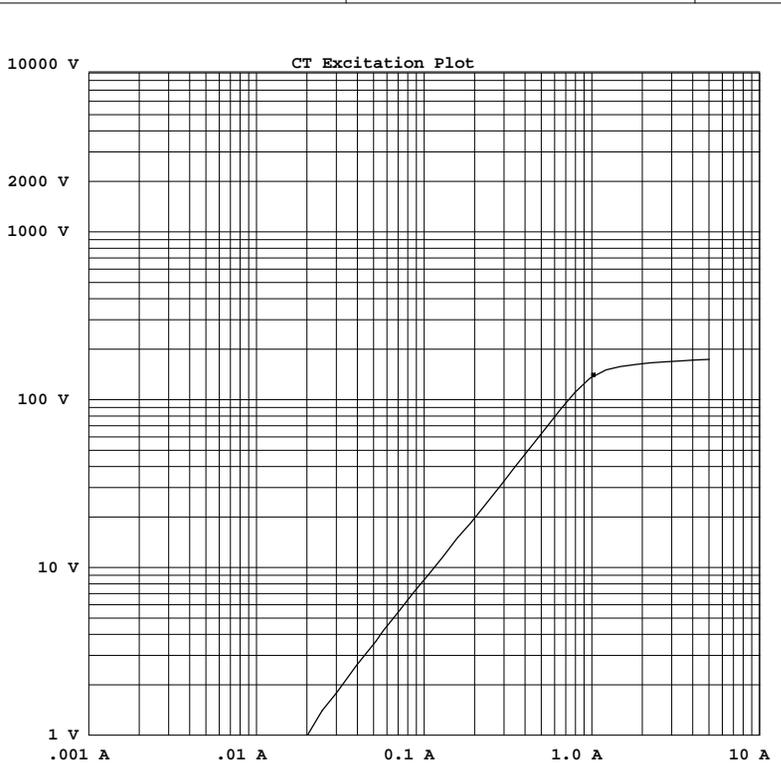
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	38.20	191.00
2	0.0020	0.20	100.00	13	0.4000	92.00	230.00
3	0.0040	0.40	100.00	14	0.5000	120.90	241.80
4	0.0050	0.40	80.00	15	0.8000	188.50	235.63
5	0.0080	0.70	87.50	16	1.0000	204.60	204.60
6	0.0100	0.90	90.00	17	2.0000	222.60	111.30
7	0.0200	2.20	110.00	18	4.0000	231.40	57.85
8	0.0400	5.20	130.00	19	5.0000	233.90	46.78
9	0.0500	7.00	140.00				
10	0.0800	12.40	155.00				
11	0.1000	16.20	162.00				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 92.100	Phase Angle:0.26°
Vkp[Volts]: 140.52	Vkp[Volts]: 114.84	Vkp[Volts]: 143.32	M-RATIO: 30.054	Ex I[Amps]: 0.675	In Phase
Ikp[Amps]: 1.0238	Ikp[Amps]: 0.8190	Ikp[Amps]: 1.1098	% ERROR: 0.1807	Winding Res: 174.92 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0160	0.68	42.50	17	0.5274	67.16	127.34
2	0.0246	1.40	56.91	18	0.6514	87.56	134.42
3	0.0302	1.80	59.60	19	0.7934	110.68	139.50
4	0.0394	2.60	65.99	20	0.9738	134.04	137.65
5	0.0516	3.64	70.54	21	1.2154	150.52	123.84
6	0.0570	4.20	73.68	22	1.4786	157.56	106.56
7	0.0698	5.40	77.36	23	1.8632	162.68	87.31
8	0.0866	7.12	82.22	24	2.2136	165.68	74.85
9	0.1062	9.08	85.50	25	2.7784	168.36	60.60
10	0.1292	11.56	89.47	26	3.3432	170.24	50.92
11	0.1576	15.00	95.18	27	4.0964	172.40	42.09
12	0.1896	18.40	97.05	28	5.0280	174.04	34.61
13	0.2316	23.68	102.25				
14	0.2898	31.40	108.35				
15	0.3502	40.08	114.45				
16	0.4308	51.96	120.61				

GRAPH POINTS

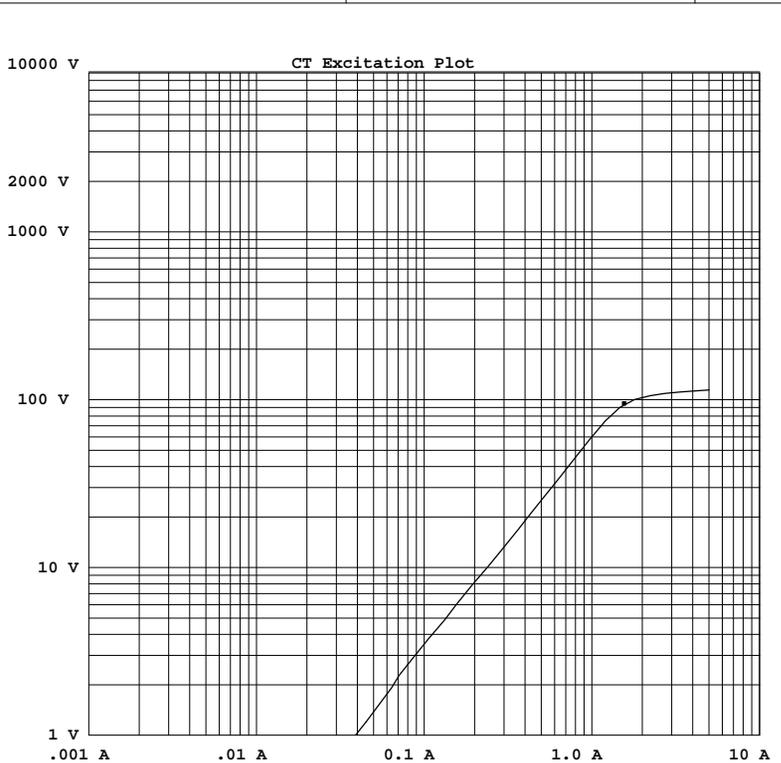
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.00	100.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.30	60.00	15	0.8000	111.90	139.88
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.60	60.00	17	2.0000	163.70	81.85
7	0.0200	1.10	55.00	18	4.0000	172.10	43.02
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.200	Phase Angle:0.16°
Vkp[Volts]: 95.00	Vkp[Volts]: 77.40	Vkp[Volts]: 97.00	M-RATIO: 20.065	Ex I[Amps]: 0.778	In Phase
Ikp[Amps]: 1.5582	Ikp[Amps]: 1.2404	Ikp[Amps]: 1.6966	% ERROR: 0.3235	Winding Res: 158.72 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0200	0.36	18.00	17	0.6472	34.60	53.46
2	0.0246	0.56	22.76	18	0.8004	45.48	56.82
3	0.0390	1.00	25.64	19	0.9722	58.16	59.82
4	0.0450	1.20	26.67	20	1.2046	74.84	62.13
5	0.0640	1.92	30.00	21	1.4728	90.12	61.19
6	0.0710	2.28	32.11	22	1.8014	100.28	55.67
7	0.0836	2.80	33.49	23	2.2332	105.80	47.38
8	0.1062	3.76	35.40	24	2.7232	108.92	40.00
9	0.1326	4.88	36.80	25	3.3498	111.08	33.16
10	0.1552	6.00	38.66	26	4.1354	112.96	27.32
11	0.1946	7.92	40.70	27	5.0118	114.32	22.81
12	0.2374	9.96	41.95				
13	0.2846	12.44	43.71				
14	0.3654	16.96	46.41				
15	0.4348	21.12	48.57				
16	0.5334	27.28	51.14				

GRAPH POINTS

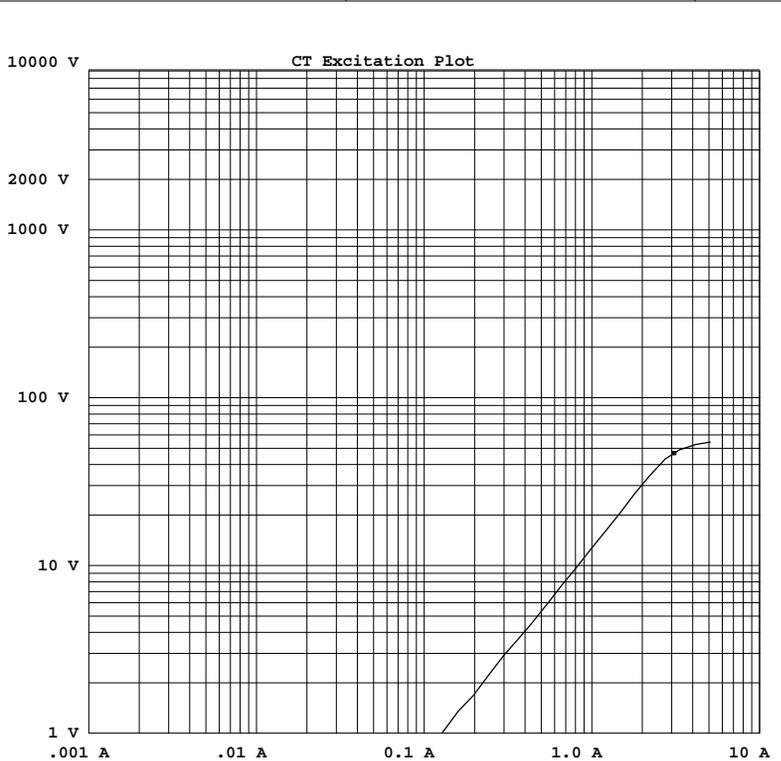
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.30	48.25
3	0.0040	0.10	25.00	14	0.5000	25.20	50.40
4	0.0050	0.10	20.00	15	0.8000	45.80	57.25
5	0.0080	0.20	25.00	16	1.0000	60.40	60.40
6	0.0100	0.20	20.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.30	22.86
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.50	35.00				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.24°
Vkp[Volts]: 46.68	Vkp[Volts]: 39.64	Vkp[Volts]: 0.00	M-RATIO: 10.114	Ex I[Amps]: 0.772	In Phase
Ikp[Amps]: 3.1046	Ikp[Amps]: 2.5320	Ikp[Amps]: 0.0000	% ERROR: 1.1450	Winding Res: 151.80 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0746	0.52	6.97	17	1.8014	26.80	14.88
2	0.0920	0.68	7.39	18	2.2072	34.16	15.48
3	0.1084	0.80	7.38	19	2.7330	43.04	15.75
4	0.1314	1.04	7.91	20	3.3302	48.92	14.69
5	0.1600	1.36	8.50	21	4.1710	52.64	12.62
6	0.1966	1.68	8.55	22	5.0864	54.40	10.70
7	0.2402	2.20	9.16				
8	0.2994	2.92	9.75				
9	0.3602	3.60	9.99				
10	0.4348	4.48	10.30				
11	0.5462	5.96	10.91				
12	0.6658	7.68	11.53				
13	0.8016	9.60	11.98				
14	0.9972	12.68	12.72				
15	1.2194	16.24	13.32				
16	1.4818	20.72	13.98				

GRAPH POINTS

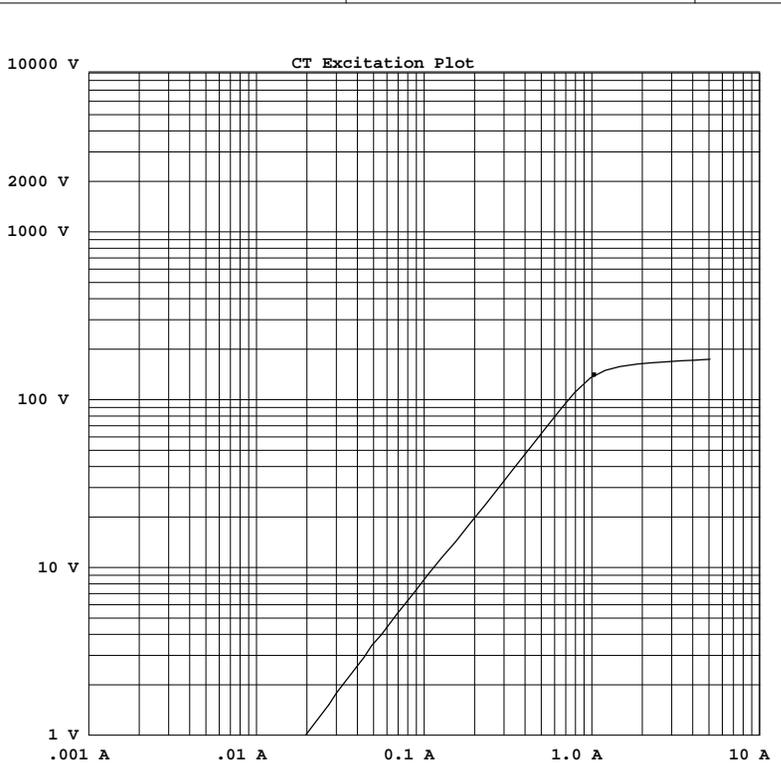
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.20	10.00	16	4.0000	51.80	12.95
6	0.0400	0.30	7.50	17	5.0000	54.10	10.82
7	0.0500	0.40	8.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.20	10.50				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 93.800	Phase Angle:0.26°
Vkp[Volts]: 141.00	Vkp[Volts]: 114.48	Vkp[Volts]: 144.08	M-RATIO: 30.060	Ex I[Amps]: 0.685	In Phase
Ikp[Amps]: 1.0278	Ikp[Amps]: 0.8164	Ikp[Amps]: 1.1174	% ERROR: 0.1990	Winding Res: 205.88 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0138	0.60	43.48	17	0.4340	52.48	120.92
2	0.0184	0.92	50.00	18	0.5400	69.20	128.15
3	0.0270	1.52	56.30	19	0.6526	87.84	134.60
4	0.0302	1.80	59.60	20	0.7914	110.40	139.50
5	0.0438	2.92	66.67	21	0.9824	135.12	137.54
6	0.0488	3.44	70.49	22	1.2022	149.72	124.54
7	0.0554	3.96	71.48	23	1.4696	157.56	107.21
8	0.0684	5.24	76.61	24	1.8794	163.24	86.86
9	0.0890	7.28	81.80	25	2.2332	165.68	74.19
10	0.1046	9.00	86.04	26	2.7168	168.08	61.87
11	0.1280	11.52	90.00	27	3.3660	170.52	50.66
12	0.1540	14.24	92.47	28	4.1256	172.16	41.73
13	0.1888	18.40	97.46	29	5.0766	174.32	34.34
14	0.2328	23.76	102.06				
15	0.2862	31.00	108.32				
16	0.3532	40.52	114.72				

GRAPH POINTS

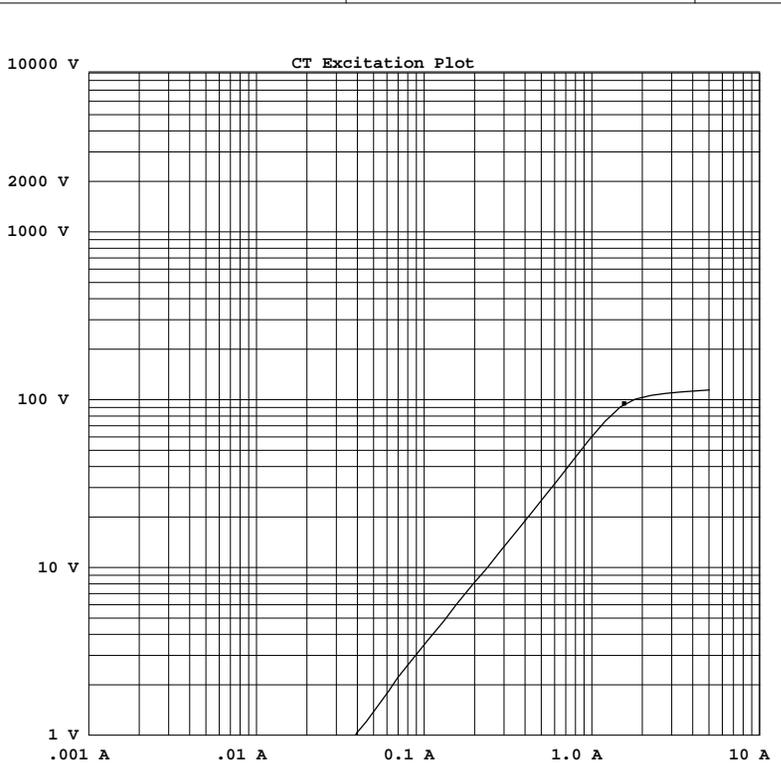
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.20	101.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.20	40.00	15	0.8000	111.80	139.75
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.50	50.00	17	2.0000	163.60	81.80
7	0.0200	1.10	55.00	18	4.0000	172.00	43.00
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.300	Phase Angle:0.16°
Vkp[Volts]: 95.04	Vkp[Volts]: 77.08	Vkp[Volts]: 96.84	M-RATIO: 20.070	Ex I[Amps]: 0.778	In Phase
Ikp[Amps]: 1.5586	Ikp[Amps]: 1.2364	Ikp[Amps]: 1.6862	% ERROR: 0.3485	Winding Res: 179.35 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0360	0.88	24.44	17	0.8004	45.60	56.97
2	0.0398	1.04	26.13	18	0.9762	58.52	59.95
3	0.0450	1.20	26.67	19	1.1992	74.44	62.07
4	0.0616	1.84	29.87	20	1.4844	90.80	61.17
5	0.0694	2.20	31.70	21	1.8144	100.68	55.49
6	0.0842	2.80	33.25	22	2.2592	106.08	46.95
7	0.1050	3.68	35.05	23	2.7492	109.04	39.66
8	0.1314	4.80	36.53	24	3.3692	111.20	33.00
9	0.1552	6.00	38.66	25	4.1580	112.96	27.17
10	0.1962	8.00	40.77	26	5.0344	114.32	22.71
11	0.2360	9.88	41.86				
12	0.2874	12.68	44.12				
13	0.3684	17.12	46.47				
14	0.4386	21.28	48.52				
15	0.5372	27.44	51.08				
16	0.6488	34.72	53.51				

GRAPH POINTS

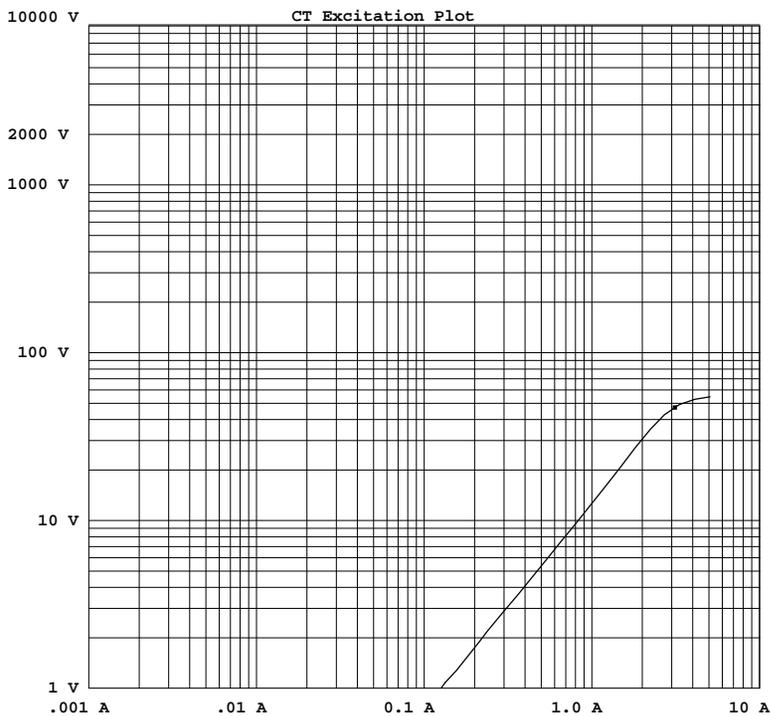
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.20	48.00
3	0.0040	0.10	25.00	14	0.5000	25.40	50.80
4	0.0050	0.10	20.00	15	0.8000	45.90	57.37
5	0.0080	0.20	25.00	16	1.0000	60.50	60.50
6	0.0100	0.30	30.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.20	22.84
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.60	36.00				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.30°
Vkp[Volts]: 47.08	Vkp[Volts]: 39.28	Vkp[Volts]: 0.00	M-RATIO: 10.119	Ex I[Amps]: 0.776	In Phase
Ikp[Amps]: 3.1344	Ikp[Amps]: 2.5020	Ikp[Amps]: 0.0000	% ERROR: 1.1930	Winding Res: 160.88 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0594	0.36	6.06	17	1.4818	20.80	14.04
2	0.0726	0.52	7.16	18	1.8112	27.04	14.93
3	0.0870	0.60	6.90	19	2.2364	35.00	15.65
4	0.1038	0.76	7.32	20	2.7136	42.68	15.73
5	0.1334	1.08	8.10	21	3.3302	49.12	14.75
6	0.1560	1.28	8.21	22	4.1190	52.76	12.81
7	0.2156	1.92	8.91	23	5.0734	54.64	10.77
8	0.2390	2.20	9.21				
9	0.3026	2.92	9.65				
10	0.3650	3.64	9.97				
11	0.4316	4.48	10.38				
12	0.5384	5.88	10.92				
13	0.6542	7.48	11.43				
14	0.7984	9.52	11.92				
15	0.9726	12.20	12.54				
16	1.2084	16.00	13.24				

GRAPH POINTS

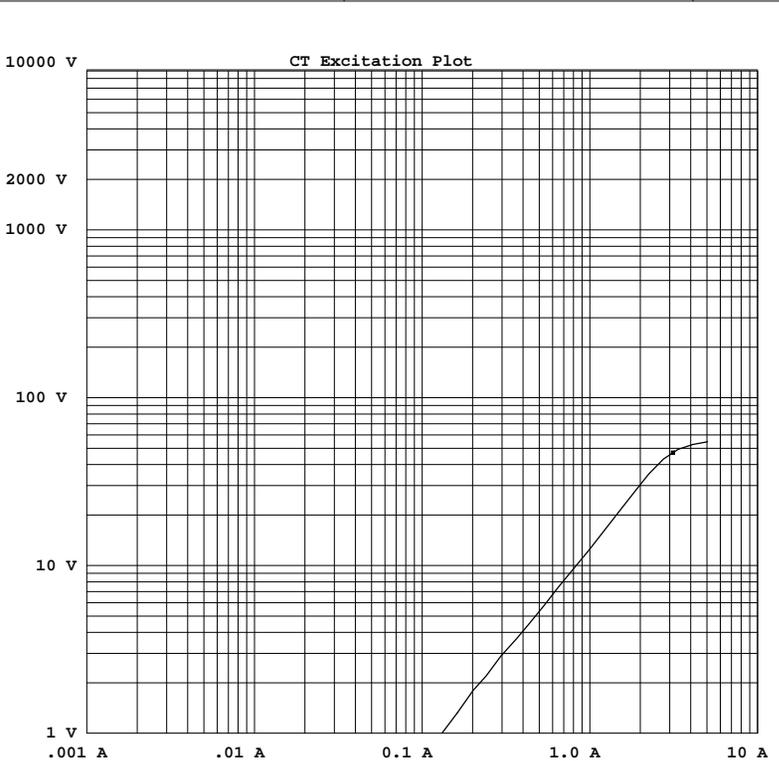
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.10	5.00	16	4.0000	52.00	13.00
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.16°
Vkp[Volts]: 47.04	Vkp[Volts]: 39.48	Vkp[Volts]: 0.00	M-RATIO: 10.098	Ex I[Amps]: 0.775	In Phase
Ikp[Amps]: 3.1400	Ikp[Amps]: 2.5182	Ikp[Amps]: 0.0000	% ERROR: 0.9830	Winding Res: 126.42 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0224	0.12	5.36	17	0.7914	9.44	11.93
2	0.0302	0.16	5.30	18	0.9874	12.36	12.52
3	0.0480	0.28	5.83	19	1.2206	16.20	13.27
4	0.0570	0.32	5.61	20	1.5070	21.20	14.07
5	0.0694	0.48	6.92	21	1.8242	27.04	14.82
6	0.0862	0.60	6.96	22	2.2396	35.00	15.63
7	0.1088	0.80	7.35	23	2.7460	43.12	15.70
8	0.1314	1.00	7.61	24	3.3596	49.24	14.66
9	0.1618	1.32	8.16	25	4.1158	52.64	12.79
10	0.2012	1.80	8.95	26	5.0442	54.60	10.82
11	0.2410	2.20	9.13				
12	0.2944	2.88	9.78				
13	0.3676	3.68	10.01				
14	0.4366	4.52	10.35				
15	0.5322	5.76	10.82				
16	0.6492	7.44	11.46				

GRAPH POINTS

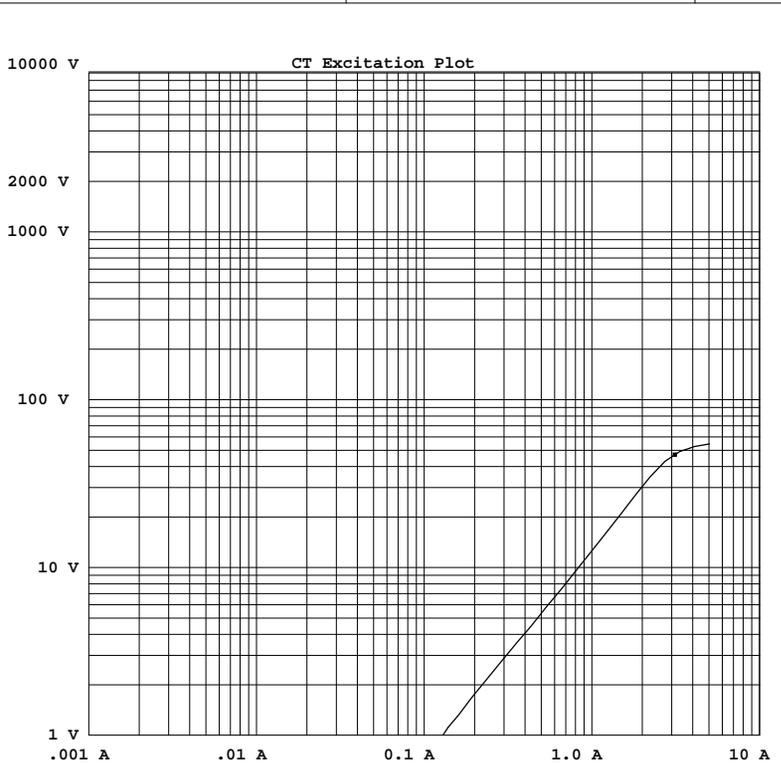
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.70	12.70
4	0.0100	0.00	0.00	15	2.0000	30.40	15.20
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.200	Phase Angle:-0.12°
Vkp[Volts]: 47.00	Vkp[Volts]: 39.40	Vkp[Volts]: 0.00	M-RATIO: 10.089	Ex I[Amps]: 0.774	In Phase
Ikp[Amps]: 3.1340	Ikp[Amps]: 2.5136	Ikp[Amps]: 0.0000	% ERROR: 0.8910	Winding Res: 114.61 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0242	0.12	4.96	17	0.9866	12.36	12.53
2	0.0410	0.24	5.85	18	1.2148	16.08	13.24
3	0.0532	0.32	6.02	19	1.4980	20.96	13.99
4	0.0796	0.56	7.04	20	1.8210	27.04	14.85
5	0.0920	0.64	6.96	21	2.2266	34.72	15.59
6	0.1084	0.76	7.01	22	2.7330	42.96	15.72
7	0.1392	1.12	8.05	23	3.3432	49.12	14.69
8	0.1606	1.32	8.22	24	4.1028	52.64	12.83
9	0.1922	1.68	8.74	25	5.0312	54.52	10.84
10	0.2398	2.20	9.17				
11	0.2886	2.76	9.56				
12	0.3602	3.60	9.99				
13	0.4320	4.44	10.28				
14	0.5392	5.88	10.91				
15	0.6640	7.52	11.33				
16	0.8186	9.80	11.97				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.50	11.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	12.60	12.60
4	0.0100	0.00	0.00	15	2.0000	30.60	15.30
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.30	7.50	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

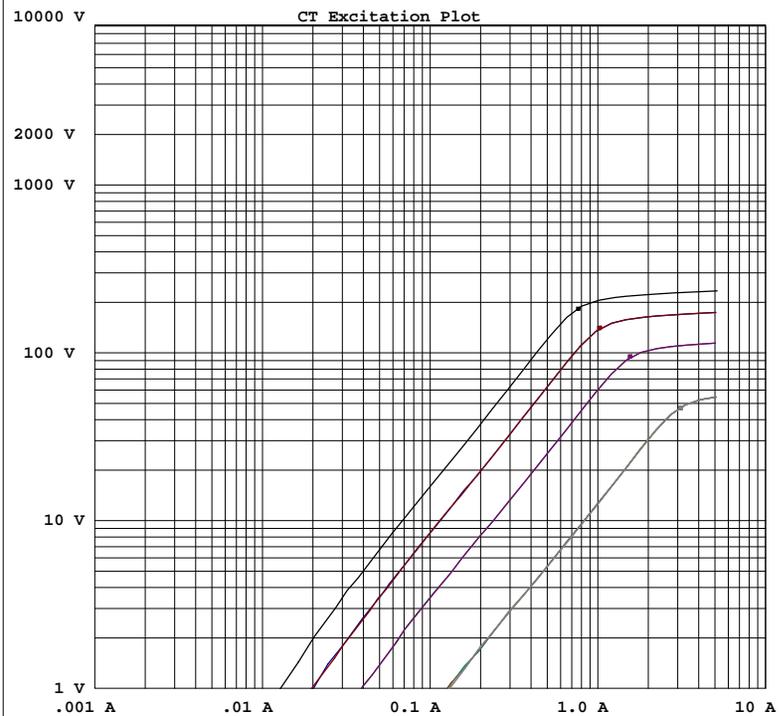
FILENAME: Piapot CTs HV (H3X1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	46.68/3.1046	39.64/2.5320	0.00/0.0000	50/5.0	10.114	1.145 %	-0.24° [In Ø]	151.80 m-ohms
2	X1-X3	95.00/1.5582	77.40/1.2404	97.00/1.6966	100/5.0	20.065	0.323 %	0.16° [In Ø]	158.72 m-ohms
3	X1-X4	140.52/1.0238	114.84/0.8190	143.32/1.1098	150/5.0	30.054	0.181 %	0.26° [In Ø]	174.92 m-ohms
4	X1-X5	183.12/0.7646	153.56/0.6198	191.60/0.8254	200/5.0	40.063	0.158 %	0.24° [In Ø]	201.16 m-ohms
5	X2-X3	47.08/3.1344	39.28/2.5020	0.00/0.0000	50/5.0	10.119	1.193 %	-0.30° [In Ø]	160.88 m-ohms
6	X2-X4	95.04/1.5586	77.08/1.2364	96.84/1.6862	100/5.0	20.070	0.349 %	0.16° [In Ø]	179.35 m-ohms
7	X2-X5	141.00/1.0278	114.48/0.8164	144.08/1.1174	150/5.0	30.060	0.199 %	0.26° [In Ø]	205.88 m-ohms
8	X3-X4	47.04/3.1400	39.48/2.5182	0.00/0.0000	50/5.0	10.098	0.983 %	-0.16° [In Ø]	126.42 m-ohms
10	X4-X5	47.00/3.1340	39.40/2.5136	0.00/0.0000	50/5.0	10.089	0.891 %	-0.12° [In Ø]	114.61 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H3X1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 14:38:11

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	

Burden Test []

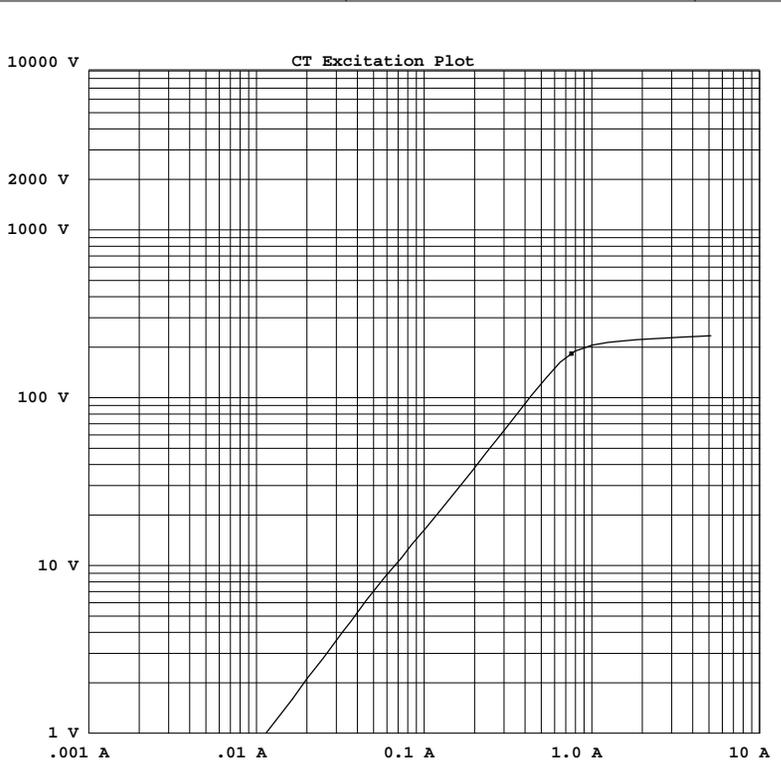
Insulation Test []

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 200/5.0	Ex V[Volts]: 98.100	Phase Angle:0.30°
Vkp[Volts]: 182.80	Vkp[Volts]: 154.16	Vkp[Volts]: 191.60	M-RATIO: 40.052	Ex I[Amps]: 0.418	In Phase
Ikp[Amps]: 0.7566	Ikp[Amps]: 0.6170	Ikp[Amps]: 0.8212	% ERROR: 0.1305	Winding Res: 200.70 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0114	1.00	87.72	17	0.3524	78.36	222.36
2	0.0164	1.60	97.56	18	0.4370	103.52	236.89
3	0.0200	2.12	106.00	19	0.5314	130.52	245.62
4	0.0250	2.80	112.00	20	0.6488	162.96	251.17
5	0.0328	4.04	123.17	21	0.7926	189.44	239.01
6	0.0368	4.68	127.17	22	1.0062	205.68	204.41
7	0.0454	6.24	137.44	23	1.2458	213.48	171.36
8	0.0586	8.60	146.76	24	1.4864	217.56	146.37
9	0.0738	11.20	151.76	25	1.8436	221.60	120.20
10	0.0842	13.32	158.19	26	2.3078	224.84	97.43
11	0.1030	16.84	163.50	27	2.8174	227.28	80.67
12	0.1256	21.48	171.02	28	3.4018	229.72	67.53
13	0.1540	27.60	179.22	29	4.1288	231.60	56.09
14	0.1938	36.68	189.27	30	5.1350	234.04	45.58
15	0.2340	46.88	200.34				
16	0.2854	60.08	210.51				

GRAPH POINTS

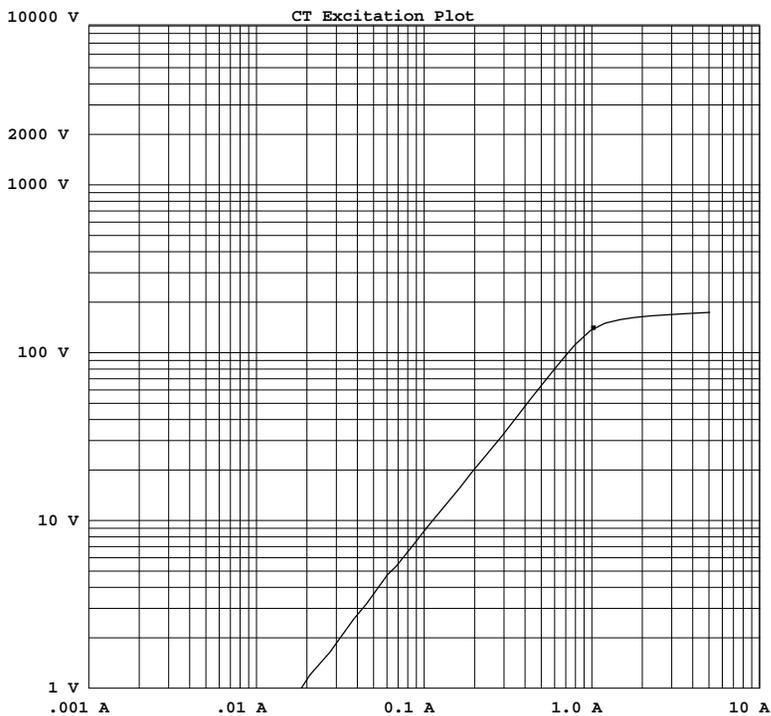
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.10	100.00	12	0.2000	38.20	191.00
2	0.0020	0.20	100.00	13	0.4000	92.00	230.00
3	0.0040	0.40	100.00	14	0.5000	120.90	241.80
4	0.0050	0.40	80.00	15	0.8000	188.50	235.63
5	0.0080	0.70	87.50	16	1.0000	204.60	204.60
6	0.0100	0.90	90.00	17	2.0000	222.60	111.30
7	0.0200	2.20	110.00	18	4.0000	231.40	57.85
8	0.0400	5.20	130.00	19	5.0000	233.90	46.78
9	0.0500	7.00	140.00				
10	0.0800	12.40	155.00				
11	0.1000	16.20	162.00				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.200	Phase Angle:0.20°
Vkp[Volts]: 140.84	Vkp[Volts]: 114.28	Vkp[Volts]: 144.32	M-RATIO: 30.049	Ex I[Amps]: 0.682	In Phase
Ikp[Amps]: 1.0232	Ikp[Amps]: 0.8092	Ikp[Amps]: 1.1142	% ERROR: 0.1617	Winding Res: 171.66 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0150	0.72	48.00	17	0.4284	52.48	122.50
2	0.0208	1.20	57.69	18	0.5342	69.20	129.54
3	0.0274	1.64	59.85	19	0.6492	88.12	135.74
4	0.0298	1.84	61.74	20	0.7938	111.76	140.79
5	0.0382	2.60	68.06	21	0.9792	135.28	138.15
6	0.0450	3.16	70.22	22	1.1984	150.00	125.17
7	0.0606	4.76	78.55	23	1.4840	157.84	106.36
8	0.0680	5.32	78.24	24	1.7982	162.16	90.18
9	0.0886	7.40	83.52	25	2.2428	165.68	73.87
10	0.1030	9.00	87.38	26	2.7266	168.08	61.64
11	0.1276	11.64	91.22	27	3.3660	170.24	50.58
12	0.1646	15.84	96.23	28	4.1256	172.16	41.73
13	0.1918	19.32	100.73	29	5.0506	174.04	34.46
14	0.2328	24.28	104.30				
15	0.2920	32.04	109.73				
16	0.3588	41.68	116.16				

GRAPH POINTS

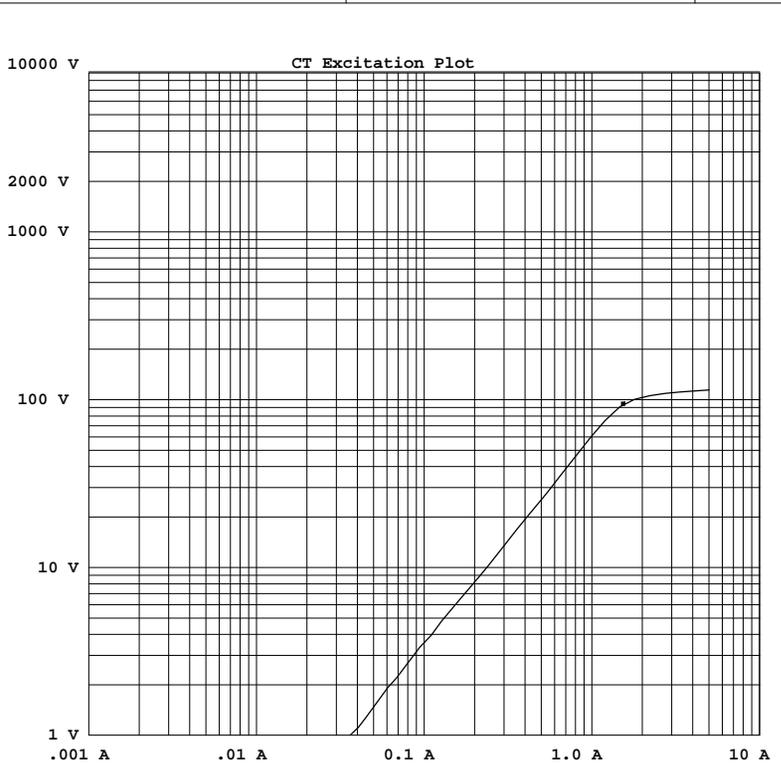
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.00	100.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.30	60.00	15	0.8000	111.90	139.88
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.60	60.00	17	2.0000	163.70	81.85
7	0.0200	1.10	55.00	18	4.0000	172.10	43.02
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.700	Phase Angle:0.18°
Vkp[Volts]: 94.64	Vkp[Volts]: 77.16	Vkp[Volts]: 96.92	M-RATIO: 20.057	Ex I[Amps]: 0.776	In Phase
Ikp[Amps]: 1.5406	Ikp[Amps]: 1.2284	Ikp[Amps]: 1.6792	% ERROR: 0.2855	Winding Res: 152.50 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0220	0.48	21.82	17	0.6460	35.00	54.18
2	0.0348	0.96	27.59	18	0.8046	46.28	57.52
3	0.0406	1.12	27.59	19	0.9918	60.32	60.82
4	0.0450	1.28	28.44	20	1.2022	75.28	62.62
5	0.0606	1.92	31.68	21	1.4712	90.68	61.64
6	0.0684	2.20	32.16	22	1.7982	100.52	55.90
7	0.0944	3.36	35.59	23	2.2234	105.80	47.58
8	0.1104	3.96	35.87	24	2.7200	108.92	40.04
9	0.1272	4.80	37.74	25	3.3466	111.08	33.19
10	0.1588	6.24	39.29	26	4.1320	112.96	27.34
11	0.1992	8.16	40.96	27	5.0084	114.32	22.83
12	0.2390	10.12	42.34				
13	0.2890	12.88	44.57				
14	0.3580	16.92	47.26				
15	0.4284	21.04	49.11				
16	0.5388	27.72	51.45				

GRAPH POINTS

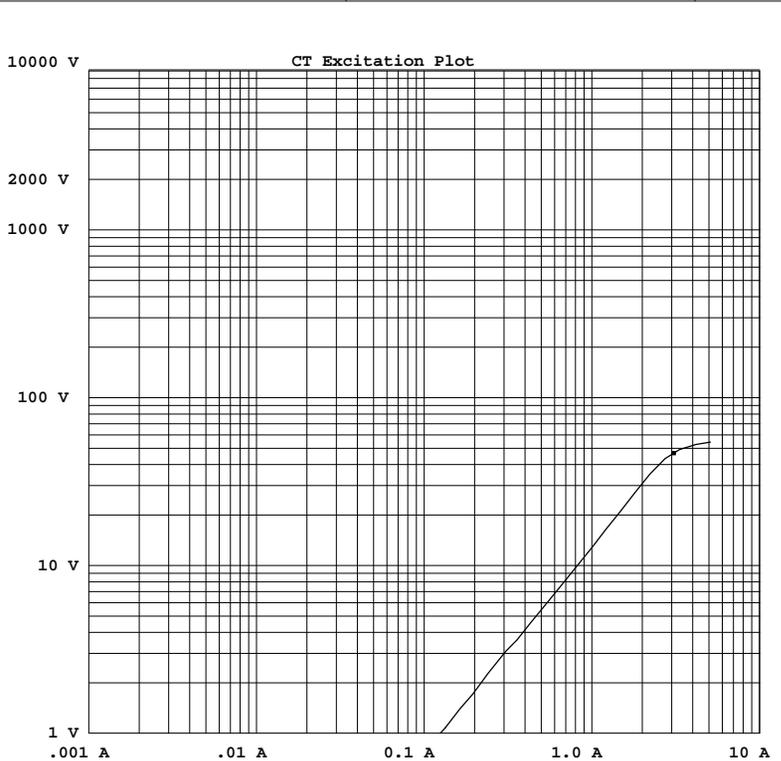
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.30	48.25
3	0.0040	0.10	25.00	14	0.5000	25.20	50.40
4	0.0050	0.10	20.00	15	0.8000	45.80	57.25
5	0.0080	0.20	25.00	16	1.0000	60.40	60.40
6	0.0100	0.20	20.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.30	22.86
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.50	35.00				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.22°
Vkp[Volts]: 46.72	Vkp[Volts]: 39.56	Vkp[Volts]: 0.00	M-RATIO: 10.109	Ex I[Amps]: 0.777	In Phase
Ikp[Amps]: 3.0850	Ikp[Amps]: 2.4978	Ikp[Amps]: 0.0000	% ERROR: 1.0910	Winding Res: 146.83 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0746	0.52	6.97	17	1.8144	27.28	15.04
2	0.0854	0.64	7.49	18	2.2170	35.00	15.79
3	0.1112	0.88	7.91	19	2.7330	43.36	15.87
4	0.1338	1.08	8.07	20	3.3336	49.12	14.73
5	0.1638	1.40	8.55	21	4.1776	52.68	12.61
6	0.1958	1.72	8.78	22	5.0994	54.40	10.67
7	0.2410	2.28	9.46				
8	0.3064	3.08	10.05				
9	0.3580	3.60	10.06				
10	0.4320	4.56	10.56				
11	0.5504	6.12	11.12				
12	0.6628	7.68	11.59				
13	0.7914	9.56	12.08				
14	1.0100	12.92	12.79				
15	1.2054	16.28	13.51				
16	1.4758	20.96	14.20				

GRAPH POINTS

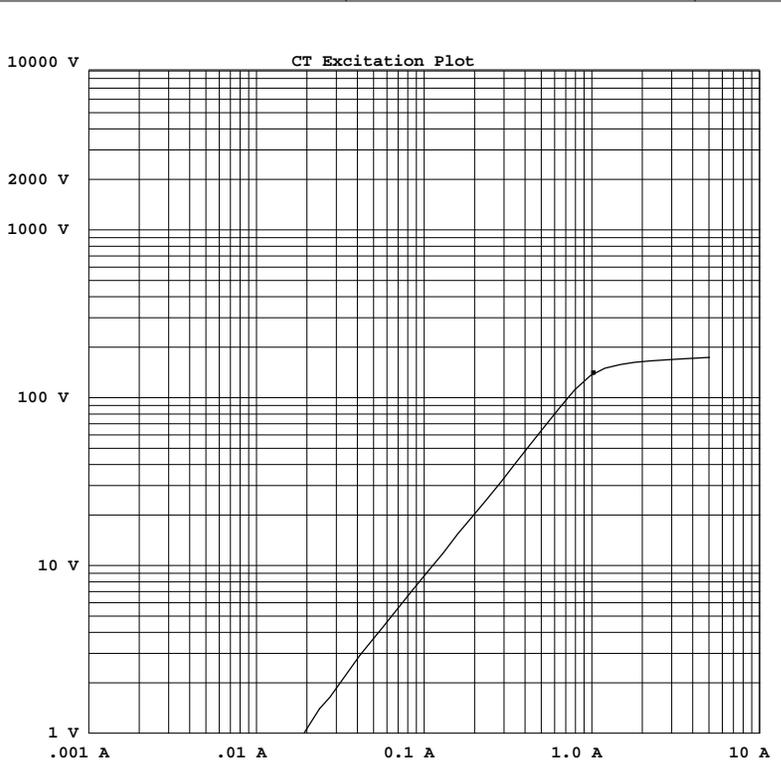
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.20	10.00	16	4.0000	51.80	12.95
6	0.0400	0.30	7.50	17	5.0000	54.10	10.82
7	0.0500	0.40	8.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.20	10.50				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 150/5.0	Ex V[Volts]: 94.900	Phase Angle:0.26°
Vkp[Volts]: 141.04	Vkp[Volts]: 114.28	Vkp[Volts]: 144.80	M-RATIO: 30.051	Ex I[Amps]: 0.685	In Phase
Ikp[Amps]: 1.0242	Ikp[Amps]: 0.8084	Ikp[Amps]: 1.1204	% ERROR: 0.1710	Winding Res: 204.83 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0156	0.72	46.15	17	0.4292	52.56	122.46
2	0.0238	1.40	58.82	18	0.5356	69.44	129.65
3	0.0274	1.64	59.85	19	0.6492	88.24	135.92
4	0.0298	1.84	61.74	20	0.7930	111.76	140.93
5	0.0414	2.92	70.53	21	0.9788	135.28	138.21
6	0.0460	3.32	72.17	22	1.1972	150.00	125.29
7	0.0566	4.28	75.62	23	1.4790	157.84	106.72
8	0.0698	5.56	79.66	24	1.7982	162.44	90.33
9	0.0862	7.24	83.99	25	2.2396	165.68	73.98
10	0.1058	9.28	87.71	26	2.7266	168.08	61.64
11	0.1292	11.80	91.33	27	3.3660	170.24	50.58
12	0.1596	15.52	97.24	28	4.1190	172.16	41.80
13	0.1892	19.00	100.42	29	5.0442	174.04	34.50
14	0.2328	24.28	104.30				
15	0.2908	31.92	109.77				
16	0.3490	40.48	115.99				

GRAPH POINTS

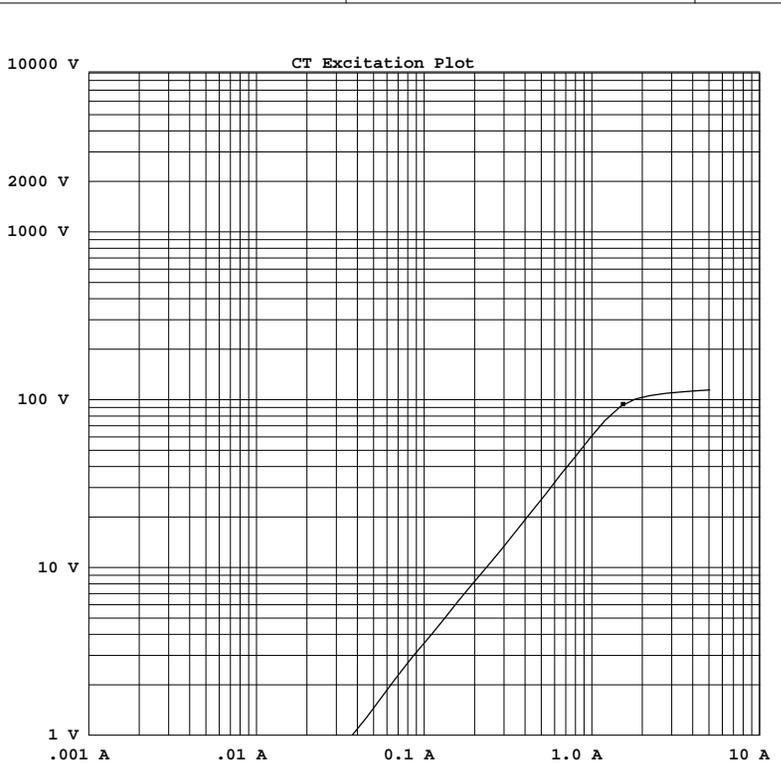
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	20.20	101.00
2	0.0020	0.10	50.00	13	0.4000	47.80	119.50
3	0.0040	0.20	50.00	14	0.5000	63.40	126.80
4	0.0050	0.20	40.00	15	0.8000	111.80	139.75
5	0.0080	0.40	50.00	16	1.0000	135.90	135.90
6	0.0100	0.50	50.00	17	2.0000	163.60	81.80
7	0.0200	1.10	55.00	18	4.0000	172.00	43.00
8	0.0400	2.80	70.00	19	5.0000	173.90	34.78
9	0.0500	3.60	72.00				
10	0.0800	6.60	82.50				
11	0.1000	8.60	86.00				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 100/5.0	Ex V[Volts]: 44.500	Phase Angle:0.18°
Vkp[Volts]: 94.12	Vkp[Volts]: 76.64	Vkp[Volts]: 96.96	M-RATIO: 20.063	Ex I[Amps]: 0.773	In Phase
Ikp[Amps]: 1.5360	Ikp[Amps]: 1.2184	Ikp[Amps]: 1.6820	% ERROR: 0.3160	Winding Res: 175.81 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0372	1.00	26.88	17	0.9726	58.92	60.58
2	0.0454	1.28	28.19	18	1.1976	75.12	62.73
3	0.0652	2.08	31.90	19	1.4892	91.48	61.43
4	0.0738	2.44	33.06	20	1.8210	100.92	55.42
5	0.0866	3.00	34.64	21	2.2072	105.80	47.93
6	0.1080	3.88	35.93	22	2.7752	109.20	39.35
7	0.1314	4.92	37.44	23	3.3854	111.20	32.85
8	0.1568	6.16	39.29	24	4.0866	112.84	27.61
9	0.1954	8.04	41.15	25	5.0572	114.32	22.61
10	0.2382	10.16	42.65				
11	0.2874	12.72	44.26				
12	0.3688	17.40	47.18				
13	0.4382	21.60	49.29				
14	0.5360	27.68	51.64				
15	0.6510	35.76	54.93				
16	0.7968	45.80	57.48				

GRAPH POINTS

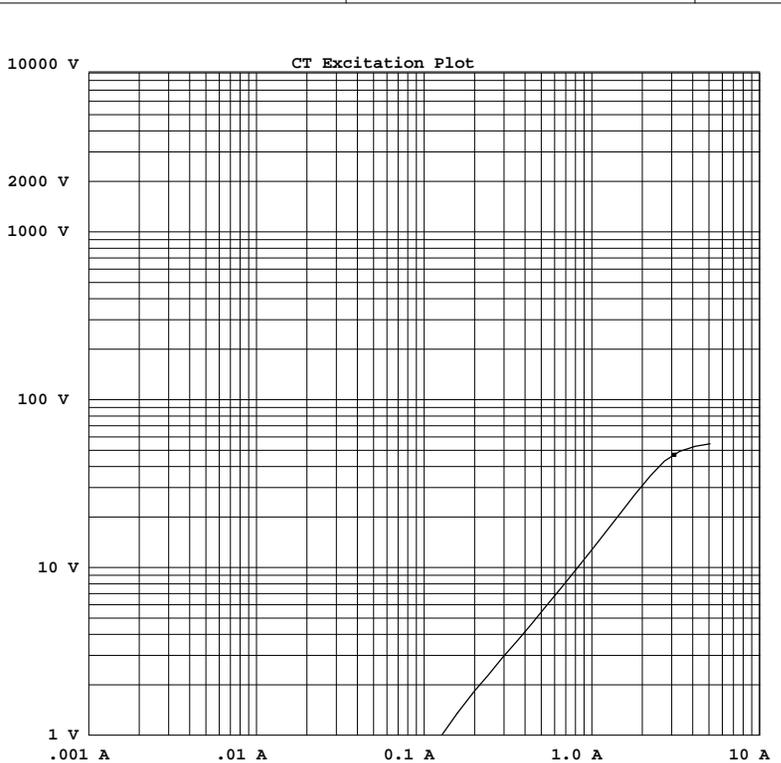
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	8.20	41.00
2	0.0020	0.00	0.00	13	0.4000	19.20	48.00
3	0.0040	0.10	25.00	14	0.5000	25.40	50.80
4	0.0050	0.10	20.00	15	0.8000	45.90	57.37
5	0.0080	0.20	25.00	16	1.0000	60.50	60.50
6	0.0100	0.30	30.00	17	2.0000	102.70	51.35
7	0.0200	0.50	25.00	18	4.0000	112.60	28.15
8	0.0400	1.10	27.50	19	5.0000	114.20	22.84
9	0.0500	1.50	30.00				
10	0.0800	2.70	33.75				
11	0.1000	3.60	36.00				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.300	Phase Angle:-0.26°
Vkp[Volts]: 46.92	Vkp[Volts]: 39.56	Vkp[Volts]: 0.00	M-RATIO: 10.114	Ex I[Amps]: 0.770	In Phase
Ikp[Amps]: 3.1032	Ikp[Amps]: 2.5000	Ikp[Amps]: 0.0000	% ERROR: 1.1440	Winding Res: 156.71 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0594	0.40	6.73	17	1.4892	21.24	14.26
2	0.0684	0.48	7.02	18	1.8112	27.28	15.06
3	0.0940	0.72	7.66	19	2.2396	35.32	15.77
4	0.1076	0.80	7.43	20	2.7136	43.04	15.86
5	0.1272	1.00	7.86	21	3.3336	49.24	14.77
6	0.1580	1.36	8.61	22	4.1288	52.76	12.78
7	0.2000	1.84	9.20	23	5.0734	54.64	10.77
8	0.2410	2.28	9.46				
9	0.2916	2.88	9.88				
10	0.3650	3.72	10.19				
11	0.4366	4.60	10.54				
12	0.5400	5.96	11.04				
13	0.6658	7.68	11.53				
14	0.8144	9.88	12.13				
15	0.9844	12.48	12.68				
16	1.2058	16.20	13.44				

GRAPH POINTS

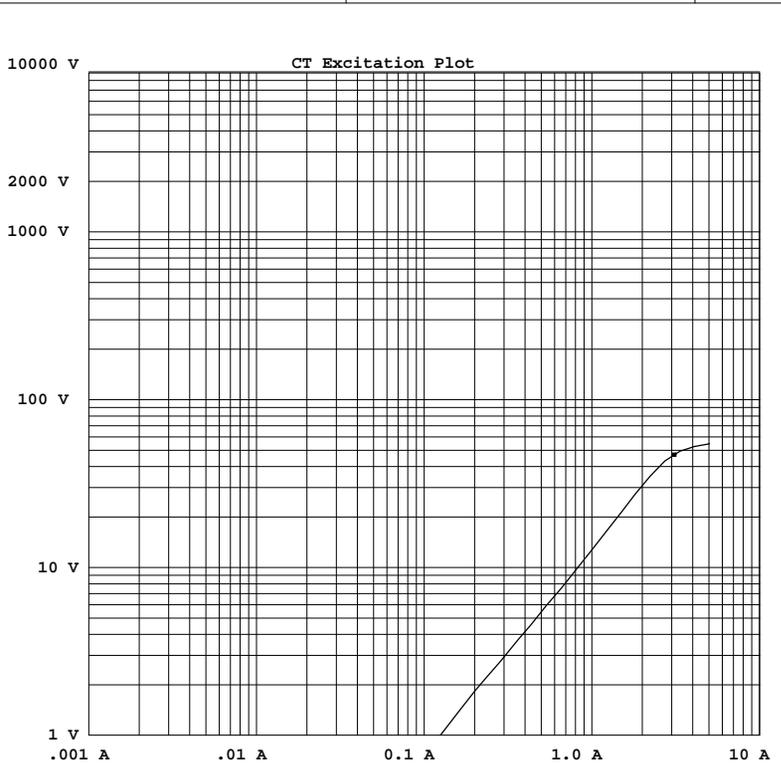
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.80	12.80
4	0.0100	0.10	10.00	15	2.0000	30.50	15.25
5	0.0200	0.10	5.00	16	4.0000	52.00	13.00
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.300	Phase Angle:-0.20°
Vkp[Volts]: 46.96	Vkp[Volts]: 39.44	Vkp[Volts]: 0.00	M-RATIO: 10.092	Ex I[Amps]: 0.774	In Phase
Ikp[Amps]: 3.1126	Ikp[Amps]: 2.4972	Ikp[Amps]: 0.0000	% ERROR: 0.9220	Winding Res: 123.91 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0204	0.12	5.88	17	0.8218	9.96	12.12
2	0.0290	0.16	5.52	18	0.9808	12.44	12.68
3	0.0484	0.32	6.61	19	1.1924	15.96	13.38
4	0.0578	0.36	6.23	20	1.5074	21.48	14.25
5	0.0702	0.48	6.84	21	1.8112	27.28	15.06
6	0.0882	0.64	7.26	22	2.2202	34.92	15.73
7	0.1088	0.84	7.72	23	2.7266	43.16	15.83
8	0.1288	1.04	8.07	24	3.3530	49.32	14.71
9	0.1584	1.36	8.59	25	4.0996	52.64	12.84
10	0.2008	1.84	9.16	26	5.0376	54.60	10.84
11	0.2378	2.24	9.42				
12	0.2850	2.76	9.68				
13	0.3672	3.76	10.24				
14	0.4340	4.56	10.51				
15	0.5346	5.92	11.07				
16	0.6596	7.56	11.46				

GRAPH POINTS

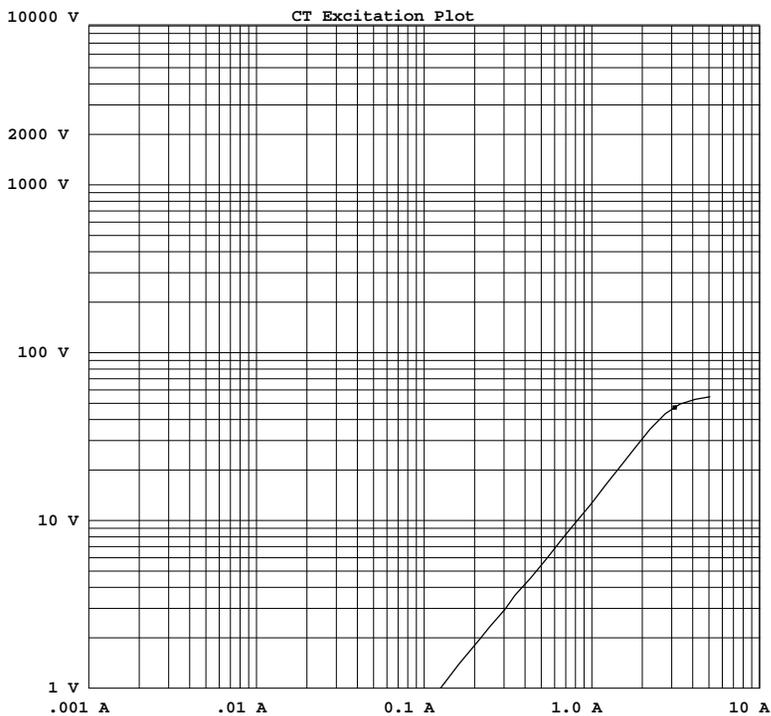
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.40	10.80
2	0.0050	0.00	0.00	13	0.8000	9.70	12.12
3	0.0080	0.00	0.00	14	1.0000	12.70	12.70
4	0.0100	0.00	0.00	15	2.0000	30.40	15.20
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.20	5.00	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 9: X4-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 50/5.0	Ex V[Volts]: 9.400	Phase Angle:-0.16°
Vkp[Volts]: 47.08	Vkp[Volts]: 39.52	Vkp[Volts]: 0.00	M-RATIO: 10.085	Ex I[Amps]: 0.779	In Phase
Ikp[Amps]: 3.1232	Ikp[Amps]: 2.5062	Ikp[Amps]: 0.0000	% ERROR: 0.8540	Winding Res: 113.54 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0238	0.12	5.04	17	0.7942	9.64	12.14
2	0.0372	0.24	6.45	18	0.9882	12.52	12.67
3	0.0512	0.32	6.25	19	1.2136	16.36	13.48
4	0.0570	0.36	6.32	20	1.5036	21.40	14.23
5	0.0768	0.56	7.29	21	1.8144	27.16	14.97
6	0.0924	0.68	7.36	22	2.2332	35.12	15.73
7	0.1054	0.80	7.59	23	2.7460	43.36	15.79
8	0.1326	1.08	8.14	24	3.3596	49.40	14.70
9	0.1618	1.40	8.65	25	4.1418	52.76	12.74
10	0.2148	1.96	9.12	26	5.0636	54.60	10.78
11	0.2456	2.32	9.45				
12	0.3034	2.96	9.76				
13	0.3490	3.60	10.32				
14	0.4296	4.52	10.52				
15	0.5404	5.96	11.03				
16	0.6538	7.60	11.62				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0040	0.00	0.00	12	0.5000	5.50	11.00
2	0.0050	0.00	0.00	13	0.8000	9.60	12.00
3	0.0080	0.00	0.00	14	1.0000	12.60	12.60
4	0.0100	0.00	0.00	15	2.0000	30.60	15.30
5	0.0200	0.10	5.00	16	4.0000	51.90	12.97
6	0.0400	0.30	7.50	17	5.0000	54.40	10.88
7	0.0500	0.30	6.00				
8	0.0800	0.60	7.50				
9	0.1000	0.80	8.00				
10	0.2000	1.80	9.00				
11	0.4000	4.10	10.25				

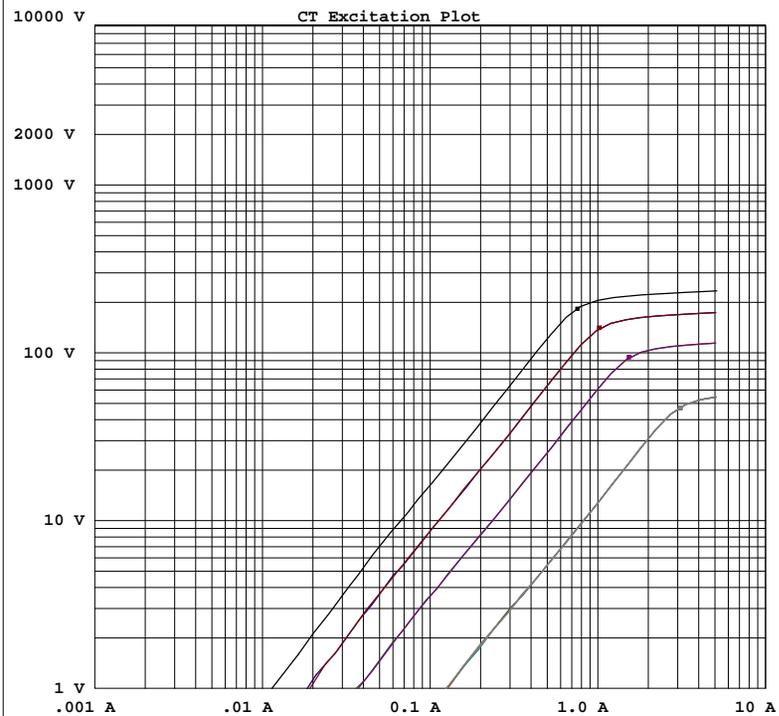
FILENAME: Piapot CTs HV (H3Y1) - Nove
 DATE: 11/25/20 14:38:11
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT:

MFR: Siemens
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	46.72/3.0850	39.56/2.4978	0.00/0.0000	50/5.0	10.109	1.091 %	-0.22° [In Ø]	146.83 m-ohms
2	X1-X3	94.64/1.5406	77.16/1.2284	96.92/1.6792	100/5.0	20.057	0.285 %	0.18° [In Ø]	152.50 m-ohms
3	X1-X4	140.84/1.0232	114.28/0.8092	144.32/1.1142	150/5.0	30.049	0.162 %	0.20° [In Ø]	171.66 m-ohms
4	X1-X5	182.80/0.7566	154.16/0.6170	191.60/0.8212	200/5.0	40.052	0.130 %	0.30° [In Ø]	200.70 m-ohms
5	X2-X3	46.92/3.1032	39.56/2.5000	0.00/0.0000	50/5.0	10.114	1.144 %	-0.26° [In Ø]	156.71 m-ohms
6	X2-X4	94.12/1.5360	76.64/1.2184	96.96/1.6820	100/5.0	20.063	0.316 %	0.18° [In Ø]	175.81 m-ohms
7	X2-X5	141.04/1.0242	114.28/0.8084	144.80/1.1204	150/5.0	30.051	0.171 %	0.26° [In Ø]	204.83 m-ohms
8	X3-X4	46.96/3.1126	39.44/2.4972	0.00/0.0000	50/5.0	10.092	0.922 %	-0.20° [In Ø]	123.91 m-ohms
10	X4-X5	47.08/3.1232	39.52/2.5062	0.00/0.0000	50/5.0	10.085	0.854 %	-0.16° [In Ø]	113.54 m-ohms

Test Notepad



FILENAME: Piapot CTs HV (H3Y1) - Nove

MFR: Siemens

TEST PLAN

DATE: 11/25/20 14:38:11

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT:

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	200/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X4	150/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X3	100/5.0	[X]	[X]	[X]	500.00	5.00	
X1-X2	50/5.0	[X]	[X]	[X]	300.00	5.00	
X2-X5	150/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X4	100/5.0	[X]	[X]	[X]	500.00	5.00	
X2-X3	50/5.0	[X]	[X]	[X]	500.00	5.00	
X3-X4	50/5.0	[X]	[X]	[X]	500.00	5.00	
X4-X5	50/5.0	[X]	[X]	[X]	500.00	5.00	

Burden Test []

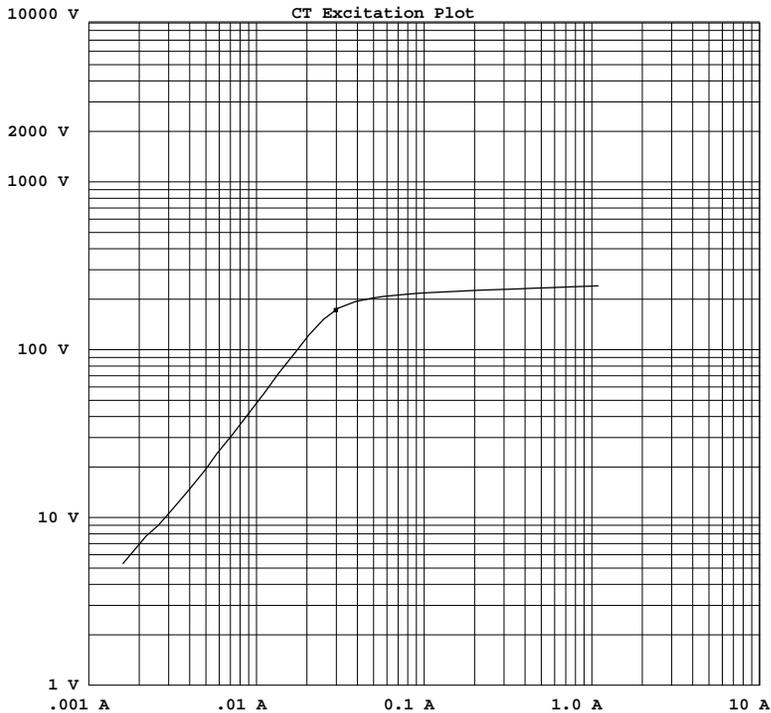
Insulation Test []

FILENAME: Piapot CTs LV (X1W1) - Nove
 DATE: 11/25/20 16:41:54
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV WTI / S

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3480/5.0	Ex V[Volts]: 98.500	Phase Angle:0.06°
Vkp[Volts]: 172.16	Vkp[Volts]: 142.40	Vkp[Volts]: 183.76	M-RATIO: 696.522	Ex I[Amps]: 0.018	In Phase
Ikp[Amps]: 0.0298	Ikp[Amps]: 0.0236	Ikp[Amps]: 0.0340	% ERROR: 0.0750	Winding Res: 585.81 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	5.32	3325.00	17	0.0492	203.24	4130.89
2	0.0022	7.76	3527.27	18	0.0570	207.56	3641.40
3	0.0026	9.00	3461.54	19	0.0784	214.04	2730.10
4	0.0032	11.40	3562.50	20	0.0920	217.00	2358.70
5	0.0040	14.80	3700.00	21	0.1062	218.64	2058.76
6	0.0050	19.44	3888.00	22	0.2198	226.48	1030.39
7	0.0058	24.00	4137.93	23	0.2868	228.64	797.21
8	0.0072	31.24	4338.89	24	0.3692	230.80	625.14
9	0.0088	40.60	4613.64	25	0.4466	232.40	520.38
10	0.0112	55.48	4953.57	26	0.5550	234.32	422.20
11	0.0136	72.56	5335.29	27	0.7652	237.28	310.09
12	0.0168	94.60	5630.95	28	0.8698	238.36	274.04
13	0.0206	122.68	5955.34	29	1.0894	240.24	220.53
14	0.0252	152.44	6049.21				
15	0.0310	177.28	5718.71				
16	0.0390	193.76	4968.21				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	3.30	3300.00	12	0.2000	225.10	1125.50
2	0.0020	7.00	3500.00	13	0.4000	231.40	578.50
3	0.0040	14.80	3700.00	14	0.5000	233.40	466.80
4	0.0050	19.40	3880.00	15	0.8000	237.60	297.00
5	0.0080	35.90	4487.50	16	1.0000	239.50	239.50
6	0.0100	48.00	4800.00				
7	0.0200	118.20	5910.00				
8	0.0400	194.70	4867.50				
9	0.0500	203.70	4074.00				
10	0.0800	214.40	2680.00				
11	0.1000	217.90	2179.00				

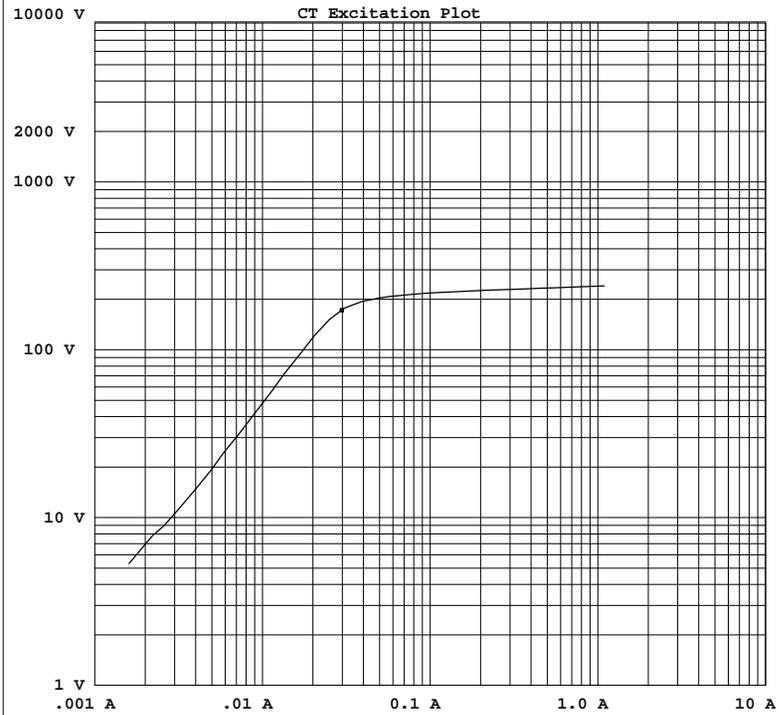
FILENAME: Piapot CTs LV (X1W1) - Nove
 DATE: 11/25/20 16:41:54
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV WTI / S

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	172.16/0.0298	142.40/0.0236	183.76/0.0340	3480/5.0	696.522	0.075 %	0.06° [In Ø]	585.81 m-ohms

Test Notepad



FILENAME: Piapot CTs LV (X1W1) - Nove

MFR:

TEST PLAN

DATE: 11/25/20 16:41:54

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT: LV WTI / S

COMMENTS:

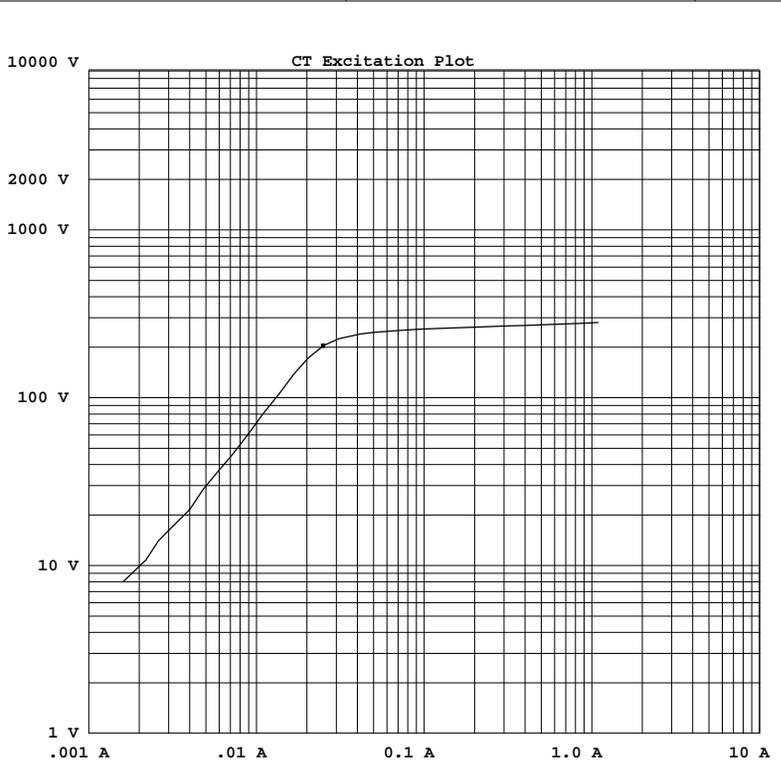
	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X2	3480/5.0	[X]	[X]	[X]	500.00	1.00	
Burden Test	[]						
Insulation Test	[]						

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 4000/5.0	Ex V[Volts]: 98.500	Phase Angle:0.02°
Vkp[Volts]: 204.00	Vkp[Volts]: 166.20	Vkp[Volts]: 213.64	M-RATIO: 800.457	Ex I[Amps]: 0.014	In Phase
Ikp[Amps]: 0.0250	Ikp[Amps]: 0.0196	Ikp[Amps]: 0.0276	% ERROR: 0.0571	Winding Res: 648.48 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	8.00	5000.00	17	0.0488	244.56	5011.48
2	0.0022	10.84	4927.27	18	0.0576	247.80	4302.08
3	0.0026	14.00	5384.62	19	0.0730	252.40	3457.53
4	0.0030	16.20	5400.00	20	0.0936	255.92	2734.19
5	0.0040	21.56	5390.00	21	0.1164	258.36	2219.59
6	0.0048	28.36	5908.33	22	0.2280	264.84	1161.58
7	0.0058	35.60	6137.93	23	0.2990	267.28	893.91
8	0.0072	45.88	6372.22	24	0.3814	269.44	706.45
9	0.0090	61.28	6808.89	25	0.4632	271.32	585.75
10	0.0110	80.68	7334.55	26	0.5420	272.68	503.10
11	0.0138	106.88	7744.93	27	0.7762	276.72	356.51
12	0.0168	139.16	8283.33	28	0.8698	277.80	319.38
13	0.0204	172.96	8478.43	29	1.0898	280.52	257.41
14	0.0252	204.84	8128.57				
15	0.0310	224.56	7243.87				
16	0.0418	240.00	5741.63				

GRAPH POINTS

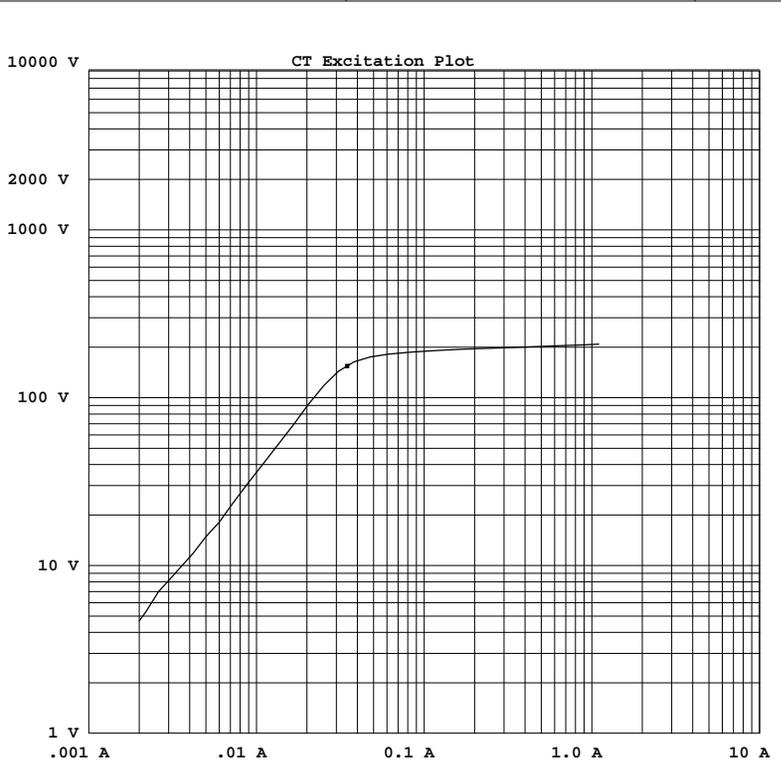
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	5.80	5800.00	12	0.2000	259.70	1298.50
2	0.0020	11.60	5800.00	13	0.4000	266.70	666.75
3	0.0040	23.20	5800.00	14	0.5000	268.90	537.80
4	0.0050	29.00	5800.00	15	0.8000	273.50	341.88
5	0.0080	46.40	5800.00	16	1.0000	276.30	276.30
6	0.0100	61.30	6130.00	17	2.0000	283.00	141.50
7	0.0200	150.80	7540.00	18	4.0000	288.80	72.20
8	0.0400	227.50	5687.50	19	5.0000	291.00	58.20
9	0.0500	235.80	4716.00				
10	0.0800	247.40	3092.50				
11	0.1000	251.00	2510.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3000/5.0	Ex V[Volts]: 98.400	Phase Angle:0.00°
Vkp[Volts]: 154.40	Vkp[Volts]: 129.12	Vkp[Volts]: 161.16	M-RATIO: 600.379	Ex I[Amps]: 0.023	In Phase
Ikp[Amps]: 0.0348	Ikp[Amps]: 0.0272	Ikp[Amps]: 0.0372	% ERROR: 0.0632	Winding Res: 479.67 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	4.68	2340.00	17	0.0478	175.12	3663.60
2	0.0022	5.32	2418.18	18	0.0608	181.60	2986.84
3	0.0026	6.96	2676.92	19	0.0772	185.92	2408.29
4	0.0032	8.76	2737.50	20	0.0860	187.56	2180.93
5	0.0042	11.84	2819.05	21	0.1178	191.08	1622.07
6	0.0050	14.88	2976.00	22	0.1396	192.96	1382.23
7	0.0060	18.12	3020.00	23	0.1660	194.32	1170.60
8	0.0072	23.36	3244.44	24	0.2226	196.48	882.66
9	0.0088	30.52	3468.18	25	0.2608	197.56	757.52
10	0.0110	40.48	3680.00	26	0.3062	198.92	649.64
11	0.0136	53.24	3914.71	27	0.3952	200.52	507.39
12	0.0168	70.00	4166.67	28	0.4450	201.32	452.40
13	0.0204	91.36	4478.43	29	0.6284	204.04	324.70
14	0.0254	119.04	4686.61	30	0.7550	205.40	272.05
15	0.0308	143.52	4659.74	31	0.8698	206.48	237.39
16	0.0382	163.52	4280.63	32	1.0990	208.36	189.59

GRAPH POINTS

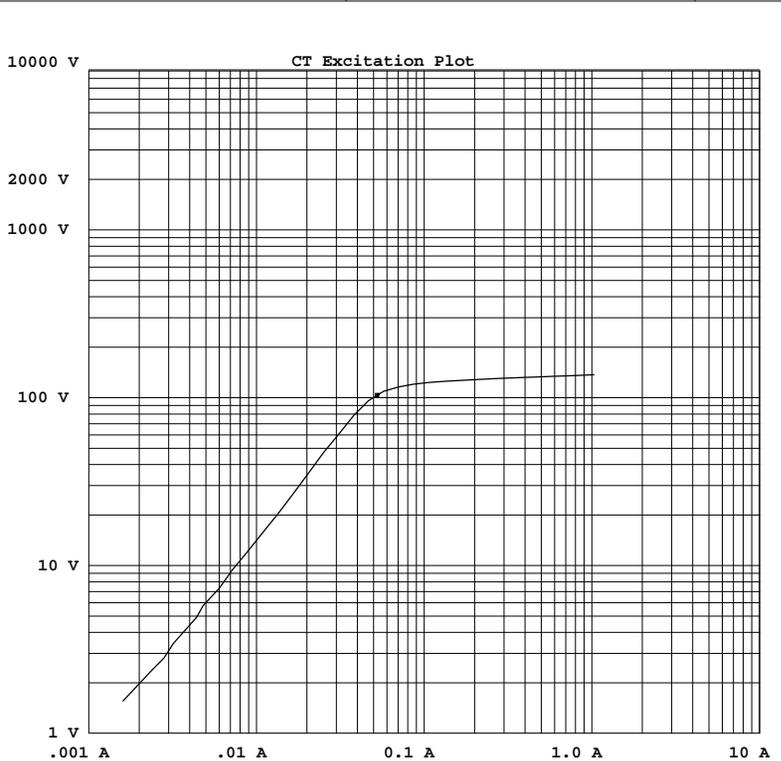
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	2.90	2900.00	12	0.2000	192.70	963.50
2	0.0020	5.80	2900.00	13	0.4000	198.20	495.50
3	0.0040	11.60	2900.00	14	0.5000	200.00	400.00
4	0.0050	14.60	2920.00	15	0.8000	203.50	254.38
5	0.0080	23.30	2912.50	16	1.0000	205.40	205.40
6	0.0100	30.80	3080.00	17	2.0000	210.80	105.40
7	0.0200	79.70	3985.00	18	4.0000	215.40	53.85
8	0.0400	155.60	3890.00	19	5.0000	217.20	43.44
9	0.0500	167.90	3358.00				
10	0.0800	181.00	2262.50				
11	0.1000	184.60	1846.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2000/5.0	Ex V[Volts]: 69.400	Phase Angle:0.00°
Vkp[Volts]: 103.56	Vkp[Volts]: 87.48	Vkp[Volts]: 109.40	M-RATIO: 400.255	Ex I[Amps]: 0.035	In Phase
Ikp[Amps]: 0.0526	Ikp[Amps]: 0.0416	Ikp[Amps]: 0.0576	% ERROR: 0.0639	Winding Res: 362.55 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	1.56	975.00	17	0.0466	96.08	2061.80
2	0.0024	2.40	1000.00	18	0.0574	109.32	1904.53
3	0.0028	2.80	1000.00	19	0.0702	115.92	1651.28
4	0.0032	3.44	1075.00	20	0.0858	120.28	1401.86
5	0.0044	4.92	1118.18	21	0.1056	123.08	1165.53
6	0.0048	5.76	1200.00	22	0.1336	125.40	938.62
7	0.0060	7.32	1220.00	23	0.2072	128.52	620.27
8	0.0072	9.44	1311.11	24	0.2564	129.84	506.40
9	0.0088	12.04	1368.18	25	0.2986	130.68	437.64
10	0.0114	16.60	1456.14	26	0.4146	132.44	319.44
11	0.0136	20.64	1517.65	27	0.4490	132.84	295.86
12	0.0166	26.84	1616.87	28	0.5806	134.04	230.86
13	0.0206	35.88	1741.75	29	0.7116	135.12	189.88
14	0.0250	46.84	1873.60	30	0.8382	135.92	162.16
15	0.0308	60.12	1951.95	31	1.0310	137.00	132.88
16	0.0380	78.36	2062.11				

GRAPH POINTS

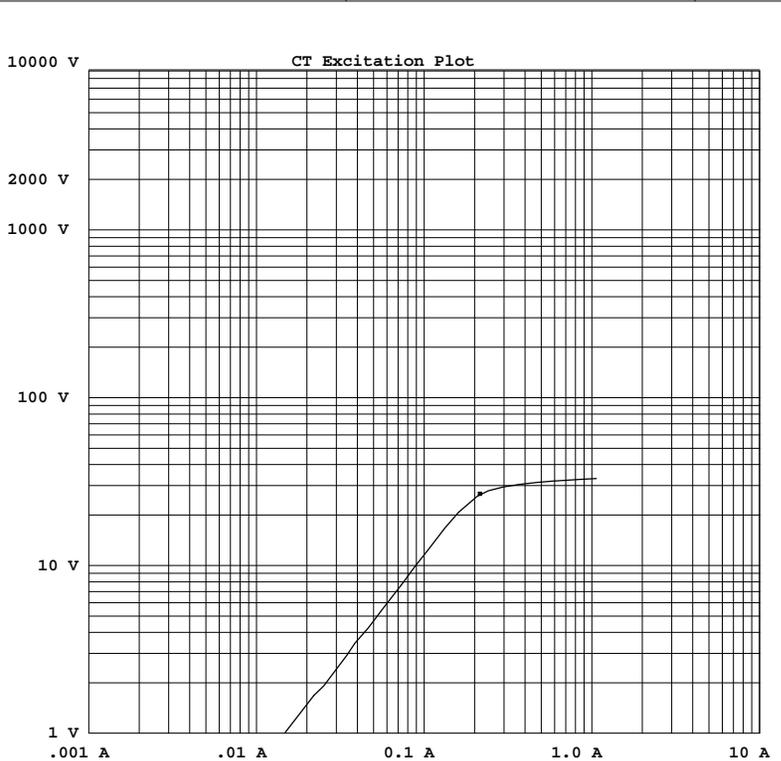
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.10	1100.00	12	0.2000	125.60	628.00
2	0.0020	2.20	1100.00	13	0.4000	130.20	325.50
3	0.0040	4.40	1100.00	14	0.5000	131.50	263.00
4	0.0050	5.60	1120.00	15	0.8000	134.00	167.50
5	0.0080	8.90	1112.50	16	1.0000	135.40	135.40
6	0.0100	11.80	1180.00	17	2.0000	139.10	69.55
7	0.0200	31.30	1565.00	18	4.0000	142.40	35.60
8	0.0400	76.10	1902.50	19	5.0000	143.20	28.64
9	0.0500	93.10	1862.00				
10	0.0800	113.60	1420.00				
11	0.1000	118.20	1182.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 500/5.0	Ex V[Volts]: 18.200	Phase Angle:-0.10°
Vkp[Volts]: 26.76	Vkp[Volts]: 20.56	Vkp[Volts]: 27.28	M-RATIO: 100.153	Ex I[Amps]: 0.143	In Phase
Ikp[Amps]: 0.2156	Ikp[Amps]: 0.1592	Ikp[Amps]: 0.2316	% ERROR: 0.1535	Winding Res: 156.99 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0138	0.92	66.67	17	0.4754	31.32	65.88
2	0.0220	1.68	76.36	18	0.5834	31.84	54.58
3	0.0252	1.92	76.19	19	0.6994	32.24	46.10
4	0.0346	2.92	84.39	20	0.8580	32.64	38.04
5	0.0386	3.44	89.12	21	1.0634	33.00	31.03
6	0.0464	4.24	91.38				
7	0.0570	5.56	97.54				
8	0.0750	7.92	105.60				
9	0.0882	9.88	112.02				
10	0.1062	12.48	117.51				
11	0.1330	16.72	125.71				
12	0.1610	20.80	129.19				
13	0.2076	25.88	124.66				
14	0.2414	27.88	115.49				
15	0.2960	29.40	99.32				
16	0.3692	30.44	82.45				

GRAPH POINTS

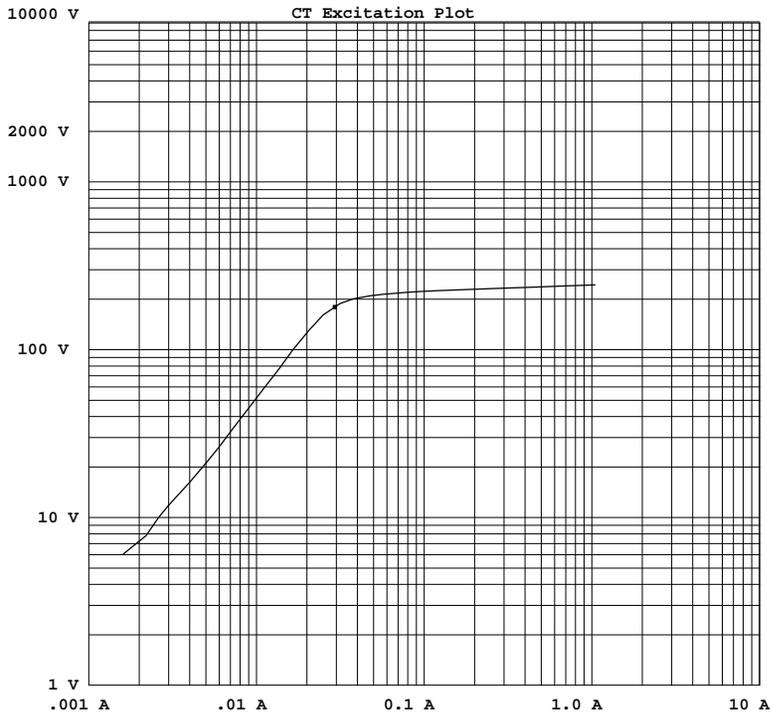
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	23.60	118.00
2	0.0020	0.10	50.00	13	0.4000	29.60	74.00
3	0.0040	0.20	50.00	14	0.5000	30.40	60.80
4	0.0050	0.30	60.00	15	0.8000	31.70	39.63
5	0.0080	0.40	50.00	16	1.0000	32.20	32.20
6	0.0100	0.60	60.00	17	2.0000	33.30	16.65
7	0.0200	1.30	65.00	18	4.0000	34.10	8.53
8	0.0400	3.20	80.00	19	5.0000	34.20	6.84
9	0.0500	4.20	84.00				
10	0.0800	7.90	98.75				
11	0.1000	10.70	107.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3500/5.0	Ex V[Volts]: 98.600	Phase Angle:0.02°
Vkp[Volts]: 179.52	Vkp[Volts]: 149.88	Vkp[Volts]: 190.20	M-RATIO: 700.453	Ex I[Amps]: 0.017	In Phase
Ikp[Amps]: 0.0294	Ikp[Amps]: 0.0234	Ikp[Amps]: 0.0324	% ERROR: 0.0647	Winding Res: 614.53 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	6.04	3775.00	17	0.0480	210.00	4375.00
2	0.0022	7.80	3545.45	18	0.0574	214.32	3733.80
3	0.0026	9.96	3830.77	19	0.0788	220.00	2791.88
4	0.0030	11.84	3946.67	20	0.0972	222.68	2290.95
5	0.0040	16.24	4060.00	21	0.1232	225.12	1827.27
6	0.0050	21.08	4216.00	22	0.2600	231.60	890.77
7	0.0060	26.40	4400.00	23	0.3342	233.76	699.46
8	0.0072	33.64	4672.22	24	0.4068	235.40	578.66
9	0.0090	44.92	4991.11	25	0.5128	237.28	462.71
10	0.0110	58.36	5305.45	26	0.6090	238.92	392.32
11	0.0136	76.60	5632.35	27	0.7198	240.24	333.76
12	0.0166	100.52	6055.42	28	0.8260	241.60	292.49
13	0.0206	130.80	6349.51	29	1.0448	243.76	233.31
14	0.0250	161.32	6452.80				
15	0.0316	188.64	5969.62				
16	0.0378	200.80	5312.17				

GRAPH POINTS

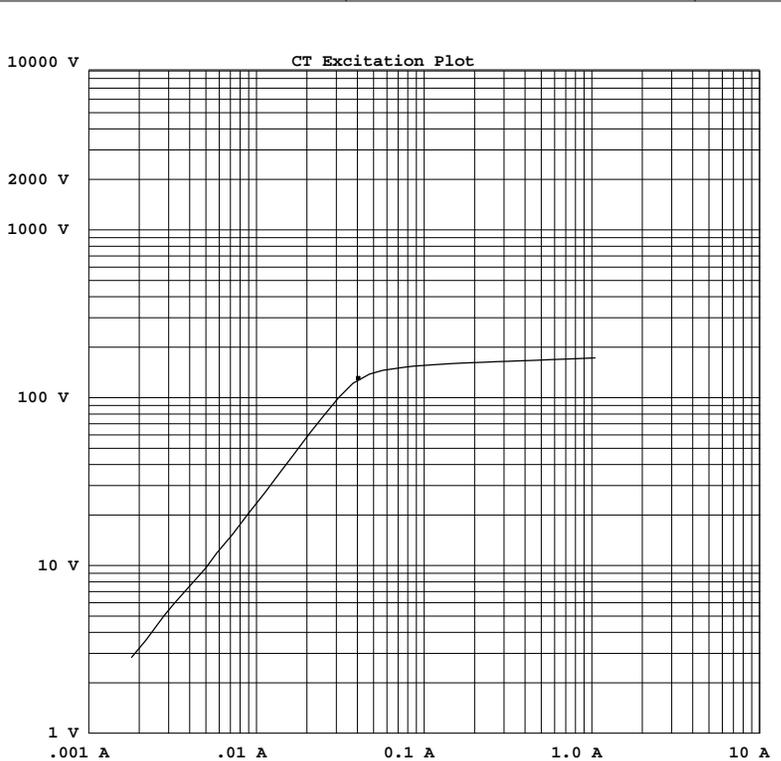
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	4.10	4100.00	12	0.2000	226.00	1130.00
2	0.0020	8.30	4150.00	13	0.4000	232.40	581.00
3	0.0040	16.60	4150.00	14	0.5000	234.30	468.60
4	0.0050	20.70	4140.00	15	0.8000	238.70	298.37
5	0.0080	33.20	4150.00	16	1.0000	240.60	240.60
6	0.0100	43.40	4340.00	17	2.0000	246.80	123.40
7	0.0200	114.30	5715.00	18	4.0000	252.20	63.05
8	0.0400	192.30	4807.50	19	5.0000	253.70	50.74
9	0.0500	202.60	4052.00				
10	0.0800	214.10	2676.25				
11	0.1000	217.90	2179.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2500/5.0	Ex V[Volts]: 81.800	Phase Angle:0.04°
Vkp[Volts]: 130.68	Vkp[Volts]: 111.12	Vkp[Volts]: 132.12	M-RATIO: 500.364	Ex I[Amps]: 0.027	In Phase
Ikp[Amps]: 0.0404	Ikp[Amps]: 0.0338	Ikp[Amps]: 0.0434	% ERROR: 0.0728	Winding Res: 445.70 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	2.84	1577.78	17	0.0472	138.36	2931.36
2	0.0022	3.60	1636.36	18	0.0568	145.92	2569.01
3	0.0028	5.00	1785.71	19	0.0786	152.68	1942.49
4	0.0032	5.88	1837.50	20	0.0864	154.32	1786.11
5	0.0040	7.56	1890.00	21	0.1184	157.84	1333.11
6	0.0050	9.68	1936.00	22	0.1412	159.44	1129.18
7	0.0058	11.88	2048.28	23	0.1652	160.80	973.37
8	0.0072	15.32	2127.78	24	0.2336	162.96	697.60
9	0.0090	20.52	2280.00	25	0.2676	164.04	613.00
10	0.0112	27.04	2414.29	26	0.3082	164.84	534.85
11	0.0138	35.76	2591.30	27	0.3642	165.92	455.57
12	0.0166	45.48	2739.76	28	0.4454	167.00	374.94
13	0.0206	60.68	2945.63	29	0.5716	168.64	295.03
14	0.0254	78.92	3107.09	30	0.6792	169.72	249.88
15	0.0310	100.40	3238.71	31	0.8166	171.08	209.50
16	0.0376	121.88	3241.49	32	1.0468	172.68	164.96

GRAPH POINTS

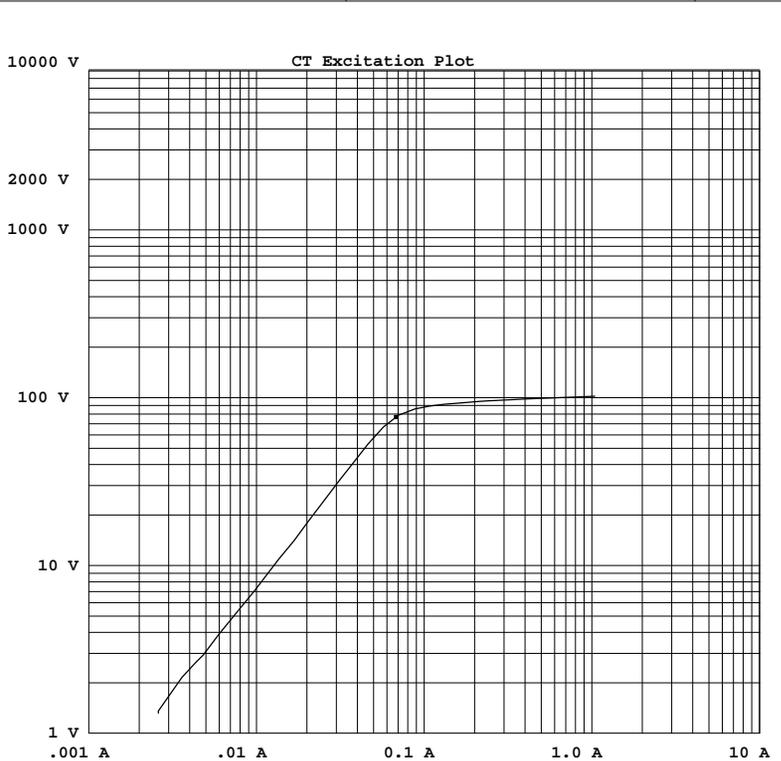
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.90	1900.00	12	0.2000	158.90	794.50
2	0.0020	3.80	1900.00	13	0.4000	164.20	410.50
3	0.0040	7.60	1900.00	14	0.5000	165.60	331.20
4	0.0050	9.50	1900.00	15	0.8000	168.90	211.13
5	0.0080	15.20	1900.00	16	1.0000	170.40	170.40
6	0.0100	20.10	2010.00	17	2.0000	174.80	87.40
7	0.0200	51.80	2590.00	18	4.0000	179.00	44.75
8	0.0400	116.70	2917.50	19	5.0000	180.20	36.04
9	0.0500	131.80	2636.00				
10	0.0800	147.70	1846.25				
11	0.1000	151.60	1516.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1500/5.0	Ex V[Volts]: 50.900	Phase Angle:-0.08°
Vkp[Volts]: 76.64	Vkp[Volts]: 63.48	Vkp[Volts]: 80.80	M-RATIO: 300.259	Ex I[Amps]: 0.045	In Phase
Ikp[Amps]: 0.0682	Ikp[Amps]: 0.0544	Ikp[Amps]: 0.0758	% ERROR: 0.0863	Winding Res: 327.88 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0026	1.32	507.69	17	0.0572	67.04	1172.03
2	0.0026	1.36	523.08	18	0.0704	78.64	1117.05
3	0.0036	2.16	600.00	19	0.0886	85.92	969.75
4	0.0044	2.68	609.09	20	0.1078	89.20	827.46
5	0.0048	2.92	608.33	21	0.1302	91.36	701.69
6	0.0060	3.92	653.33	22	0.2166	95.28	439.89
7	0.0080	5.56	695.00	23	0.2402	95.80	398.83
8	0.0098	7.12	726.53	24	0.3586	97.68	272.39
9	0.0112	8.48	757.14	25	0.3898	98.12	251.72
10	0.0136	10.92	802.94	26	0.4754	99.04	208.33
11	0.0168	14.12	840.48	27	0.5724	99.72	174.21
12	0.0204	18.36	900.00	28	0.6682	100.40	150.25
13	0.0252	24.24	961.90	29	0.8406	101.20	120.39
14	0.0314	32.36	1030.57	30	1.0414	102.00	97.95
15	0.0380	41.28	1086.32				
16	0.0464	53.12	1144.83				

GRAPH POINTS

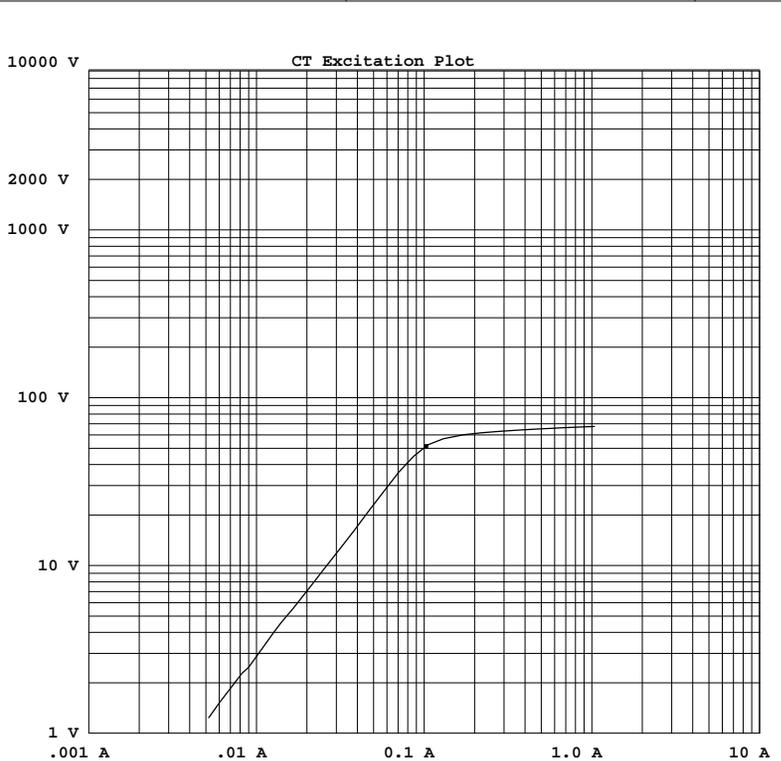
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.60	600.00	12	0.2000	92.30	461.50
2	0.0020	1.20	600.00	13	0.4000	96.50	241.25
3	0.0040	2.50	625.00	14	0.5000	97.70	195.40
4	0.0050	3.10	620.00	15	0.8000	99.70	124.63
5	0.0080	5.00	625.00	16	1.0000	100.70	100.70
6	0.0100	6.20	620.00	17	2.0000	103.40	51.70
7	0.0200	16.10	805.00	18	4.0000	105.80	26.45
8	0.0400	40.80	1020.00	19	5.0000	106.70	21.34
9	0.0500	53.20	1064.00				
10	0.0800	77.80	972.50				
11	0.1000	84.00	840.00				

FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1000/5.0	Ex V[Volts]: 34.300	Phase Angle:-0.06°
Vkp[Volts]: 51.36	Vkp[Volts]: 42.48	Vkp[Volts]: 53.32	M-RATIO: 200.177	Ex I[Amps]: 0.068	In Phase
Ikp[Amps]: 0.1028	Ikp[Amps]: 0.0824	Ikp[Amps]: 0.1104	% ERROR: 0.0887	Winding Res: 236.16 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0052	1.24	238.46	17	0.1304	56.96	436.81
2	0.0060	1.52	253.33	18	0.1718	60.20	350.41
3	0.0082	2.28	278.05	19	0.2174	61.76	284.08
4	0.0090	2.48	275.56	20	0.2706	62.92	232.52
5	0.0126	3.96	314.29	21	0.2956	63.32	214.21
6	0.0140	4.56	325.71	22	0.3878	64.40	166.06
7	0.0166	5.56	334.94	23	0.5148	65.32	126.88
8	0.0214	7.68	358.88	24	0.5672	65.68	115.80
9	0.0250	9.40	376.00	25	0.6674	66.20	99.19
10	0.0324	13.08	403.70	26	0.8212	66.76	81.30
11	0.0384	16.24	422.92	27	1.0362	67.44	65.08
12	0.0474	21.56	454.85				
13	0.0576	27.72	481.25				
14	0.0708	36.08	509.60				
15	0.0868	44.92	517.51				
16	0.1054	52.44	497.53				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.20	200.00	12	0.2000	59.10	295.50
2	0.0020	0.40	200.00	13	0.4000	63.10	157.75
3	0.0040	0.90	225.00	14	0.5000	64.00	128.00
4	0.0050	1.10	220.00	15	0.8000	65.70	82.13
5	0.0080	1.80	225.00	16	1.0000	66.40	66.40
6	0.0100	2.40	240.00	17	2.0000	68.20	34.10
7	0.0200	6.20	310.00	18	4.0000	69.90	17.48
8	0.0400	15.90	397.50	19	5.0000	70.30	14.06
9	0.0500	21.40	428.00				
10	0.0800	38.20	477.50				
11	0.1000	46.90	469.00				

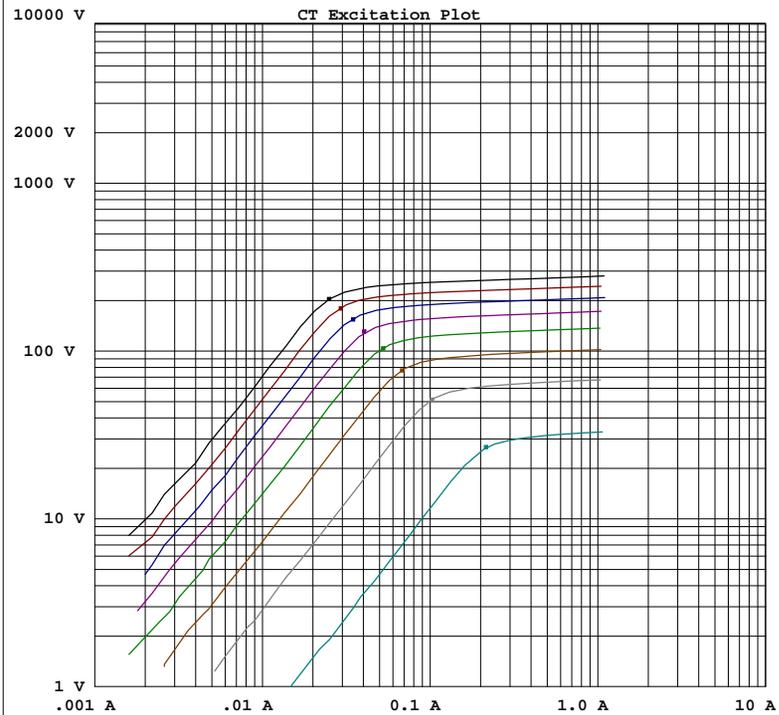
FILENAME: Piapot CTs LV (X1X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	26.76/0.2156	20.56/0.1592	27.28/0.2316	500/5.0	100.153	0.153 %	-0.10° [In Ø]	156.99 m-ohms
2	X1-X3	103.56/0.0526	87.48/0.0416	109.40/0.0576	2000/5.0	400.255	0.064 %	0.00° [In Ø]	362.55 m-ohms
3	X1-X4	154.40/0.0348	129.12/0.0272	161.16/0.0372	3000/5.0	600.379	0.063 %	0.00° [In Ø]	479.67 m-ohms
4	X1-X5	204.00/0.0250	166.20/0.0196	213.64/0.0276	4000/5.0	800.457	0.057 %	0.02° [In Ø]	648.48 m-ohms
5	X2-X3	76.64/0.0682	63.48/0.0544	80.80/0.0758	1500/5.0	300.259	0.086 %	-0.08° [In Ø]	327.88 m-ohms
6	X2-X4	130.68/0.0404	111.12/0.0338	132.12/0.0434	2500/5.0	500.364	0.073 %	0.04° [In Ø]	445.70 m-ohms
7	X2-X5	179.52/0.0294	149.88/0.0234	190.20/0.0324	3500/5.0	700.453	0.065 %	0.02° [In Ø]	614.53 m-ohms
8	X3-X4	51.36/0.1028	42.48/0.0824	53.32/0.1104	1000/5.0	200.177	0.089 %	-0.06° [In Ø]	236.16 m-ohms

Test Notepad



FILENAME: Piapot CTs LV (X1X1) - Nove

MFR:

TEST PLAN

DATE: 11/25/20 15:54:39

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT: LV CTs

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	4000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X4	3000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X3	2000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X2	500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X5	3500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X4	2500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X3	1500/5.0	[X]	[X]	[X]	500.00	1.00	
X3-X4	1000/5.0	[X]	[X]	[X]	500.00	1.00	

Burden Test []

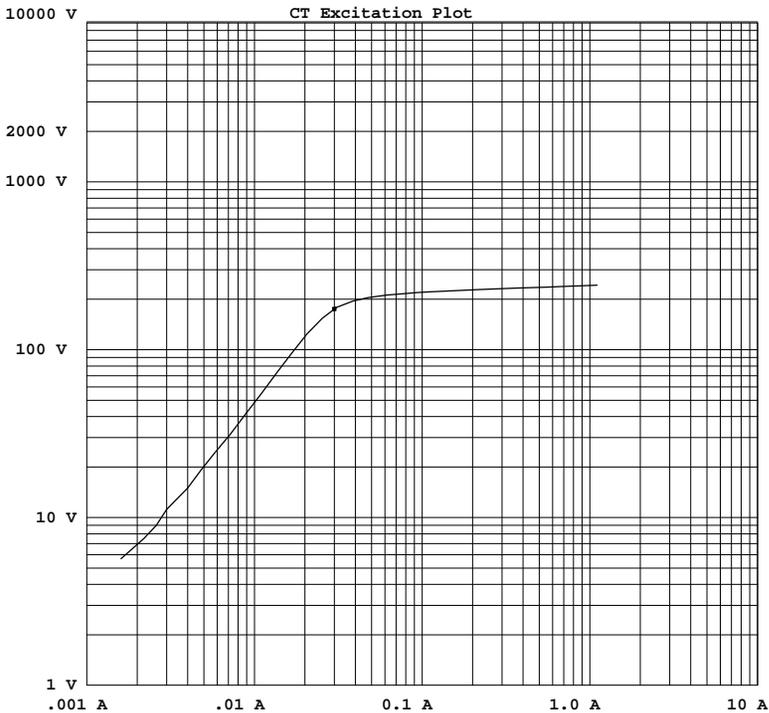
Insulation Test []

FILENAME: Piapot CTs LV (X2S1) - Nove
 DATE: 11/25/20 16:41:54
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV WTI / S

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3480/5.0	Ex V[Volts]: 98.800	Phase Angle:0.04°
Vkp[Volts]: 174.88	Vkp[Volts]: 141.40	Vkp[Volts]: 184.88	M-RATIO: 696.475	Ex I[Amps]: 0.018	In Phase
Ikp[Amps]: 0.0300	Ikp[Amps]: 0.0234	Ikp[Amps]: 0.0338	% ERROR: 0.0683	Winding Res: 551.97 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	5.68	3550.00	17	0.0476	204.32	4292.44
2	0.0022	7.52	3418.18	18	0.0616	211.60	3435.06
3	0.0026	9.00	3461.54	19	0.0766	215.64	2815.14
4	0.0030	11.20	3733.33	20	0.0942	219.16	2326.54
5	0.0040	15.00	3750.00	21	0.1100	221.32	2012.00
6	0.0048	19.20	4000.00	22	0.2238	228.64	1021.63
7	0.0058	24.28	4186.21	23	0.2966	231.08	779.10
8	0.0072	31.44	4366.67	24	0.3688	232.96	631.67
9	0.0090	42.28	4697.78	25	0.4600	234.84	510.52
10	0.0110	54.72	4974.55	26	0.5630	236.48	420.04
11	0.0136	72.96	5364.71	27	0.7684	239.44	311.61
12	0.0166	94.60	5698.80	28	0.8804	240.52	273.19
13	0.0206	124.16	6027.18	29	1.1048	242.68	219.66
14	0.0254	154.04	6064.57				
15	0.0310	178.92	5771.61				
16	0.0386	195.12	5054.92				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	3.30	3300.00	12	0.2000	225.10	1125.50
2	0.0020	7.00	3500.00	13	0.4000	231.40	578.50
3	0.0040	14.80	3700.00	14	0.5000	233.40	466.80
4	0.0050	19.40	3880.00	15	0.8000	237.60	297.00
5	0.0080	35.90	4487.50	16	1.0000	239.50	239.50
6	0.0100	48.00	4800.00				
7	0.0200	118.20	5910.00				
8	0.0400	194.70	4867.50				
9	0.0500	203.70	4074.00				
10	0.0800	214.40	2680.00				
11	0.1000	217.90	2179.00				

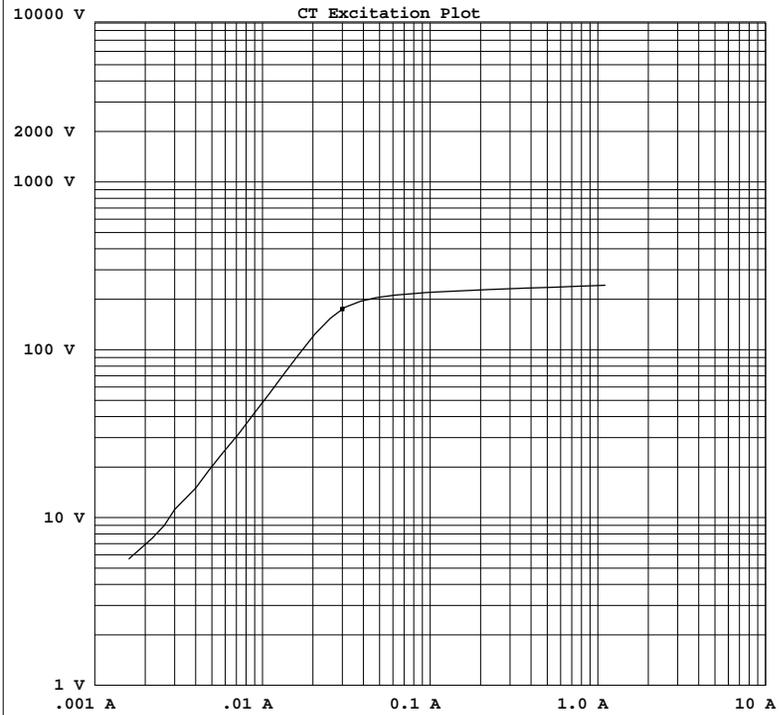
FILENAME: Piapot CTs LV (X2S1) - Nove
 DATE: 11/25/20 16:41:54
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV WTI / S

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	174.88/0.0300	141.40/0.0234	184.88/0.0338	3480/5.0	696.475	0.068 %	0.04° [In Ø]	551.97 m-ohms

Test Notepad



FILENAME: Piapot CTs LV (X2S1) - Nove

MFR:

TEST PLAN

DATE: 11/25/20 16:41:54

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT: LV WTI / S

COMMENTS:

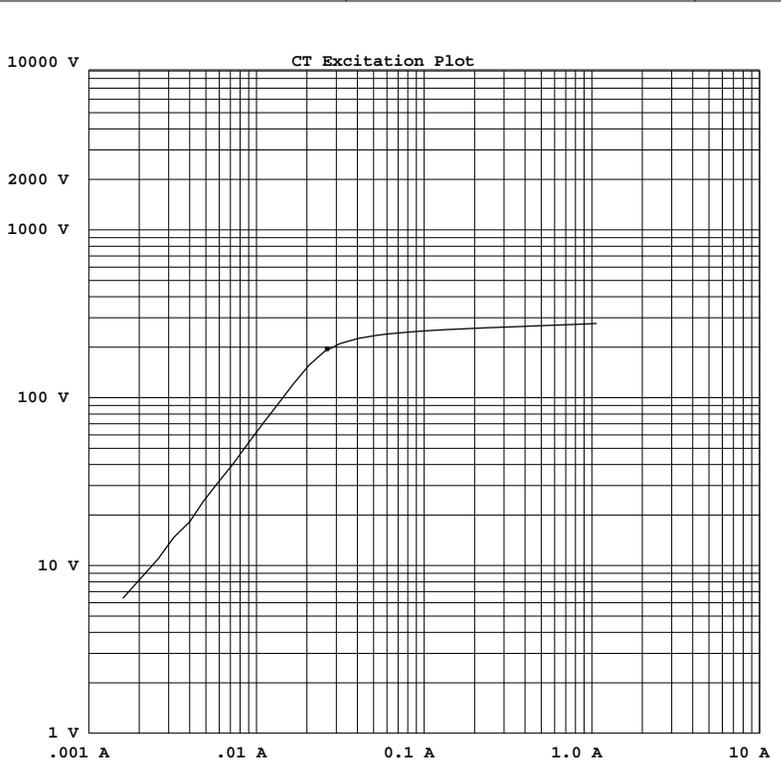
	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X2	3480/5.0	[X]	[X]	[X]	500.00	1.00	
Burden Test	[]						
Insulation Test	[]						

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 4000/5.0	Ex V[Volts]: 127.100	Phase Angle:0.00°
Vkp[Volts]: 195.40	Vkp[Volts]: 159.20	Vkp[Volts]: 206.36	M-RATIO: 800.472	Ex I[Amps]: 0.018	In Phase
Ikp[Amps]: 0.0264	Ikp[Amps]: 0.0210	Ikp[Amps]: 0.0304	% ERROR: 0.0590	Winding Res: 666.64 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	6.40	4000.00	17	0.0518	235.12	4539.00
2	0.0020	8.20	4100.00	18	0.0604	239.72	3968.87
3	0.0026	11.00	4230.77	19	0.0732	244.32	3337.70
4	0.0032	14.64	4575.00	20	0.0876	247.80	2828.77
5	0.0040	18.20	4550.00	21	0.1104	251.88	2281.52
6	0.0048	24.00	5000.00	22	0.1334	254.56	1908.25
7	0.0058	30.60	5275.86	23	0.2364	261.08	1104.40
8	0.0072	39.92	5544.44	24	0.2990	263.48	881.20
9	0.0090	54.04	6004.44	25	0.3796	265.92	700.53
10	0.0110	70.68	6425.45	26	0.4658	268.08	575.53
11	0.0136	92.96	6835.29	27	0.5534	269.96	487.82
12	0.0166	120.52	7260.24	28	0.7424	272.96	367.67
13	0.0206	156.48	7596.12	29	0.8304	274.04	330.01
14	0.0254	188.36	7415.75	30	1.0634	277.28	260.75
15	0.0316	210.52	6662.03				
16	0.0404	225.40	5579.21				

GRAPH POINTS

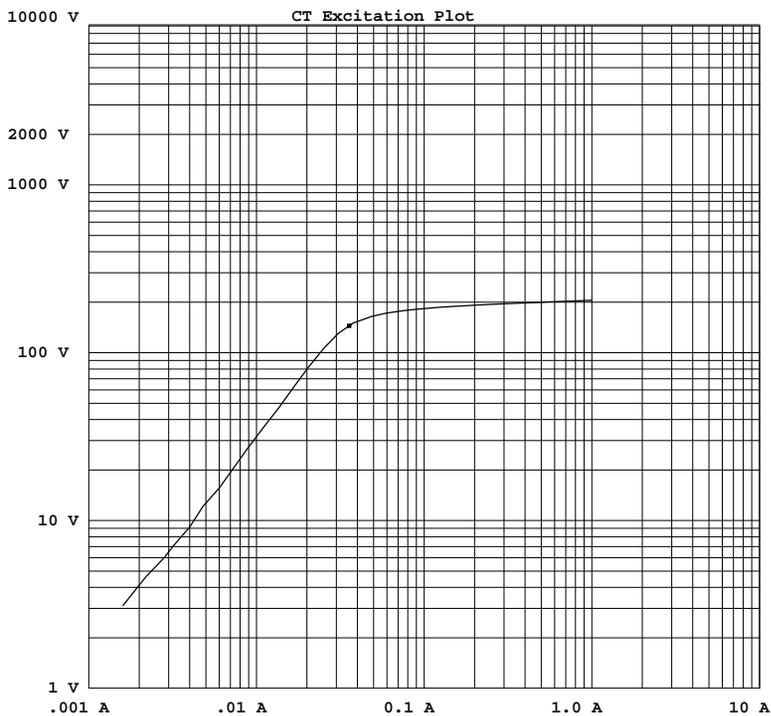
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	5.80	5800.00	12	0.2000	259.70	1298.50
2	0.0020	11.60	5800.00	13	0.4000	266.70	666.75
3	0.0040	23.20	5800.00	14	0.5000	268.90	537.80
4	0.0050	29.00	5800.00	15	0.8000	273.50	341.88
5	0.0080	46.40	5800.00	16	1.0000	276.30	276.30
6	0.0100	61.30	6130.00	17	2.0000	283.00	141.50
7	0.0200	150.80	7540.00	18	4.0000	288.80	72.20
8	0.0400	227.50	5687.50	19	5.0000	291.00	58.20
9	0.0500	235.80	4716.00				
10	0.0800	247.40	3092.50				
11	0.1000	251.00	2510.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3000/5.0	Ex V[Volts]: 94.400	Phase Angle:0.02°
Vkp[Volts]: 144.52	Vkp[Volts]: 119.64	Vkp[Volts]: 156.12	M-RATIO: 600.366	Ex I[Amps]: 0.024	In Phase
Ikp[Amps]: 0.0358	Ikp[Amps]: 0.0284	Ikp[Amps]: 0.0422	% ERROR: 0.0609	Winding Res: 498.88 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	3.12	1950.00	17	0.0488	164.84	3377.87
2	0.0022	4.64	2109.09	18	0.0592	172.16	2908.11
3	0.0028	5.96	2128.57	19	0.0754	178.36	2365.52
4	0.0032	7.08	2212.50	20	0.0888	181.32	2041.89
5	0.0040	9.16	2290.00	21	0.1168	185.92	1591.78
6	0.0048	12.16	2533.33	22	0.1310	187.56	1431.76
7	0.0060	15.64	2606.67	23	0.2064	192.40	932.17
8	0.0074	20.96	2832.43	24	0.2698	194.84	722.16
9	0.0088	26.68	3031.82	25	0.3002	195.68	651.83
10	0.0112	36.68	3275.00	26	0.3930	197.84	503.41
11	0.0136	46.88	3447.06	27	0.4920	199.72	405.93
12	0.0166	61.88	3727.71	28	0.5546	200.80	362.06
13	0.0204	81.88	4013.73	29	0.7602	203.24	267.35
14	0.0252	106.08	4209.52	30	0.8876	204.56	230.46
15	0.0308	130.40	4233.77	31	1.0026	205.40	204.87
16	0.0378	150.24	3974.60				

GRAPH POINTS

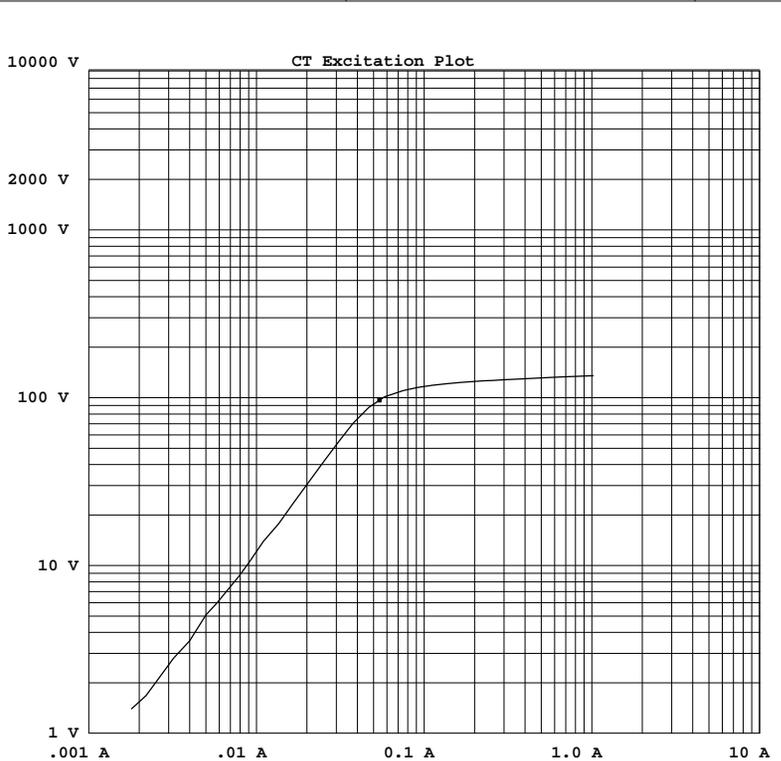
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	2.90	2900.00	12	0.2000	192.70	963.50
2	0.0020	5.80	2900.00	13	0.4000	198.20	495.50
3	0.0040	11.60	2900.00	14	0.5000	200.00	400.00
4	0.0050	14.60	2920.00	15	0.8000	203.50	254.38
5	0.0080	23.30	2912.50	16	1.0000	205.40	205.40
6	0.0100	30.80	3080.00	17	2.0000	210.80	105.40
7	0.0200	79.70	3985.00	18	4.0000	215.40	53.85
8	0.0400	155.60	3890.00	19	5.0000	217.20	43.44
9	0.0500	167.90	3358.00				
10	0.0800	181.00	2262.50				
11	0.1000	184.60	1846.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2000/5.0	Ex V[Volts]: 64.400	Phase Angle:0.02°
Vkp[Volts]: 96.48	Vkp[Volts]: 78.04	Vkp[Volts]: 104.52	M-RATIO: 400.329	Ex I[Amps]: 0.036	In Phase
Ikp[Amps]: 0.0542	Ikp[Amps]: 0.0410	Ikp[Amps]: 0.0642	% ERROR: 0.0822	Winding Res: 363.38 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	1.40	777.78	17	0.0466	87.16	1870.39
2	0.0022	1.68	763.64	18	0.0580	101.20	1744.83
3	0.0030	2.56	853.33	19	0.0754	110.40	1464.19
4	0.0032	2.80	875.00	20	0.0914	115.12	1259.52
5	0.0040	3.56	890.00	21	0.1124	118.76	1056.58
6	0.0050	5.08	1016.00	22	0.1374	121.20	882.10
7	0.0058	5.96	1027.59	23	0.1664	123.52	742.31
8	0.0078	8.56	1097.44	24	0.2268	126.20	556.44
9	0.0090	10.36	1151.11	25	0.2564	126.88	494.85
10	0.0110	13.92	1265.45	26	0.2928	127.96	437.02
11	0.0136	17.80	1308.82	27	0.3826	129.60	338.73
12	0.0166	23.52	1416.87	28	0.4556	130.80	287.09
13	0.0208	32.08	1542.31	29	0.5664	132.00	233.05
14	0.0254	42.04	1655.12	30	0.6876	133.24	193.78
15	0.0310	54.80	1767.74	31	0.8166	134.16	164.29
16	0.0376	70.28	1869.15	32	1.0188	135.40	132.90

GRAPH POINTS

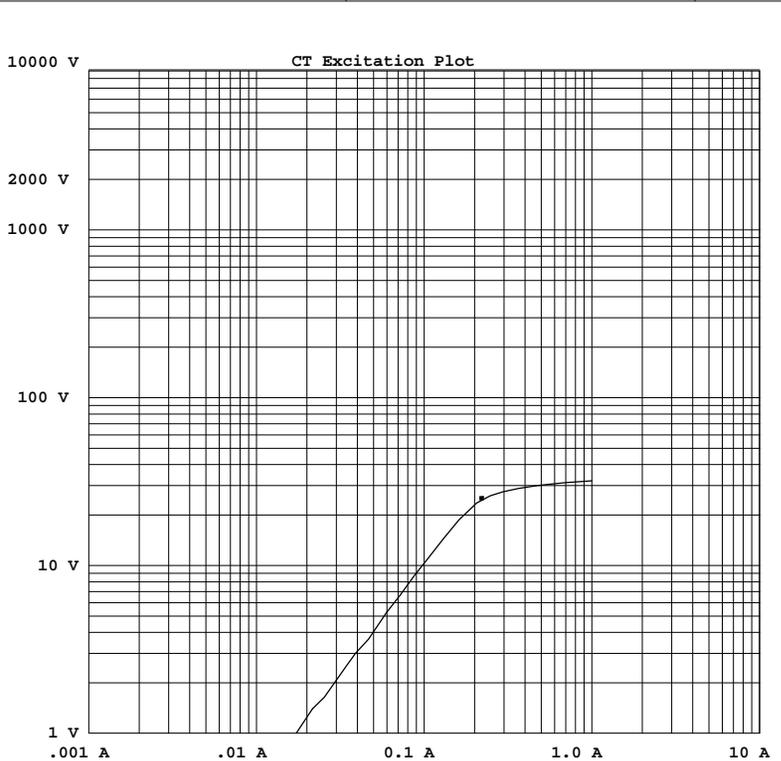
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.10	1100.00	12	0.2000	125.60	628.00
2	0.0020	2.20	1100.00	13	0.4000	130.20	325.50
3	0.0040	4.40	1100.00	14	0.5000	131.50	263.00
4	0.0050	5.60	1120.00	15	0.8000	134.00	167.50
5	0.0080	8.90	1112.50	16	1.0000	135.40	135.40
6	0.0100	11.80	1180.00	17	2.0000	139.10	69.55
7	0.0200	31.30	1565.00	18	4.0000	142.40	35.60
8	0.0400	76.10	1902.50	19	5.0000	143.20	28.64
9	0.0500	93.10	1862.00				
10	0.0800	113.60	1420.00				
11	0.1000	118.20	1182.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 500/5.0	Ex V[Volts]: 16.800	Phase Angle:-0.08°
Vkp[Volts]: 25.16	Vkp[Volts]: 19.96	Vkp[Volts]: 26.40	M-RATIO: 100.199	Ex I[Amps]: 0.147	In Phase
Ikp[Amps]: 0.2202	Ikp[Amps]: 0.1708	Ikp[Amps]: 0.2602	% ERROR: 0.1991	Winding Res: 155.45 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0154	0.84	54.55	17	0.4670	29.88	63.98
2	0.0216	1.40	64.81	18	0.5436	30.44	56.00
3	0.0254	1.64	64.57	19	0.6926	31.16	44.99
4	0.0344	2.52	73.26	20	0.8596	31.68	36.85
5	0.0390	3.00	76.92	21	1.0042	32.04	31.91
6	0.0466	3.64	78.11				
7	0.0596	5.24	87.92				
8	0.0722	6.68	92.52				
9	0.0878	8.76	99.77				
10	0.1052	11.00	104.56				
11	0.1304	14.44	110.74				
12	0.1616	18.72	115.84				
13	0.2064	23.64	114.53				
14	0.2482	26.04	104.92				
15	0.2960	27.52	92.97				
16	0.3666	28.84	78.67				

GRAPH POINTS

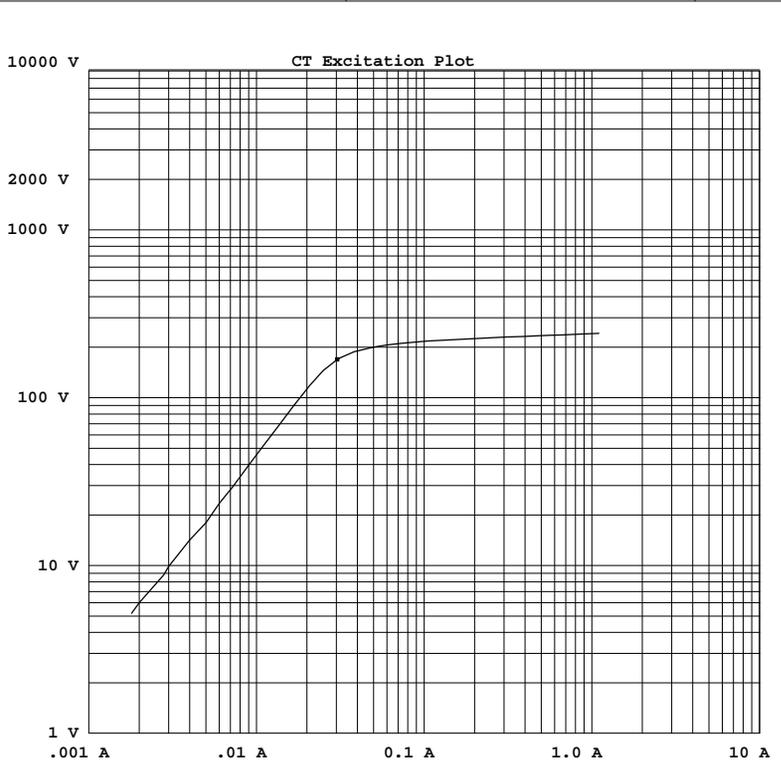
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	23.60	118.00
2	0.0020	0.10	50.00	13	0.4000	29.60	74.00
3	0.0040	0.20	50.00	14	0.5000	30.40	60.80
4	0.0050	0.30	60.00	15	0.8000	31.70	39.63
5	0.0080	0.40	50.00	16	1.0000	32.20	32.20
6	0.0100	0.60	60.00	17	2.0000	33.30	16.65
7	0.0200	1.30	65.00	18	4.0000	34.10	8.53
8	0.0400	3.20	80.00	19	5.0000	34.20	6.84
9	0.0500	4.20	84.00				
10	0.0800	7.90	98.75				
11	0.1000	10.70	107.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3500/5.0	Ex V[Volts]: 97.400	Phase Angle:0.00°
Vkp[Volts]: 169.24	Vkp[Volts]: 138.48	Vkp[Volts]: 181.56	M-RATIO: 700.398	Ex I[Amps]: 0.019	In Phase
Ikp[Amps]: 0.0304	Ikp[Amps]: 0.0240	Ikp[Amps]: 0.0354	% ERROR: 0.0568	Winding Res: 627.88 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	5.20	2888.89	17	0.0496	200.00	4032.26
2	0.0020	6.00	3000.00	18	0.0600	206.20	3436.67
3	0.0028	8.80	3142.86	19	0.0726	210.80	2903.58
4	0.0030	9.88	3293.33	20	0.0906	215.12	2374.39
5	0.0040	14.20	3550.00	21	0.1058	218.08	2061.25
6	0.0050	17.96	3592.00	22	0.2380	227.28	954.96
7	0.0060	23.48	3913.33	23	0.3074	230.00	748.21
8	0.0072	29.32	4072.22	24	0.3854	231.88	601.66
9	0.0090	39.64	4404.44	25	0.4596	233.48	508.01
10	0.0110	51.76	4705.45	26	0.5672	235.64	415.44
11	0.0138	69.60	5043.48	27	0.6670	237.00	355.32
12	0.0166	88.92	5356.63	28	0.8828	239.72	271.55
13	0.0208	118.52	5698.08	29	1.1016	241.88	219.57
14	0.0250	145.12	5804.80				
15	0.0308	171.08	5554.55				
16	0.0384	188.08	4897.92				

GRAPH POINTS

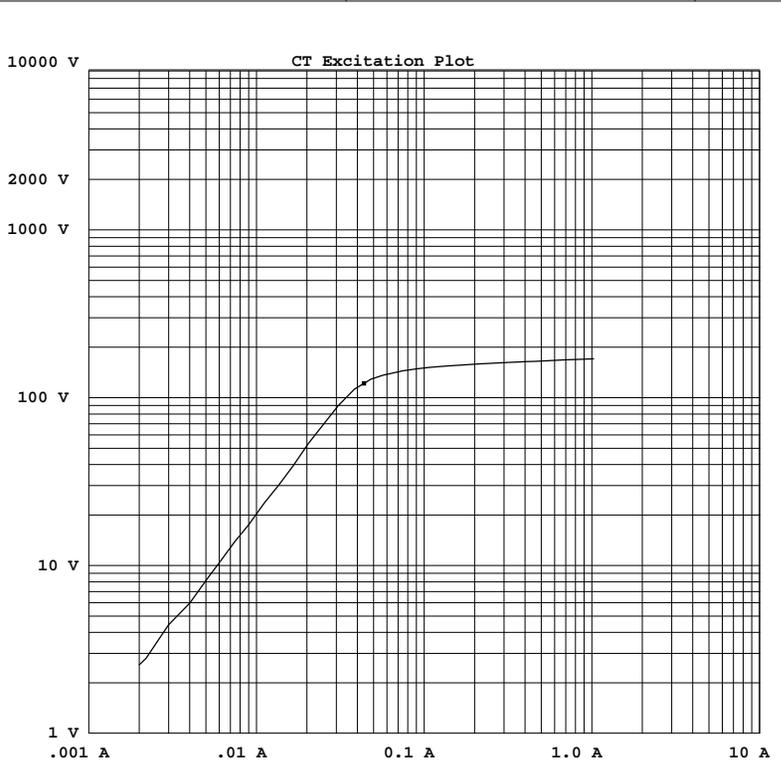
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	4.10	4100.00	12	0.2000	226.00	1130.00
2	0.0020	8.30	4150.00	13	0.4000	232.40	581.00
3	0.0040	16.60	4150.00	14	0.5000	234.30	468.60
4	0.0050	20.70	4140.00	15	0.8000	238.70	298.37
5	0.0080	33.20	4150.00	16	1.0000	240.60	240.60
6	0.0100	43.40	4340.00	17	2.0000	246.80	123.40
7	0.0200	114.30	5715.00	18	4.0000	252.20	63.05
8	0.0400	192.30	4807.50	19	5.0000	253.70	50.74
9	0.0500	202.60	4052.00				
10	0.0800	214.10	2676.25				
11	0.1000	217.90	2179.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2500/5.0	Ex V[Volts]: 81.700	Phase Angle:-0.04°
Vkp[Volts]: 121.72	Vkp[Volts]: 101.76	Vkp[Volts]: 130.68	M-RATIO: 500.351	Ex I[Amps]: 0.029	In Phase
Ikp[Amps]: 0.0438	Ikp[Amps]: 0.0348	Ikp[Amps]: 0.0502	% ERROR: 0.0702	Winding Res: 460.23 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0020	2.56	1280.00	17	0.0482	129.04	2677.18
2	0.0022	2.80	1272.73	18	0.0568	136.08	2395.77
3	0.0026	3.60	1384.62	19	0.0748	144.84	1936.36
4	0.0030	4.44	1480.00	20	0.0918	148.92	1622.22
5	0.0040	5.96	1490.00	21	0.1074	151.60	1411.55
6	0.0052	8.60	1653.85	22	0.1330	154.32	1160.30
7	0.0060	10.40	1733.33	23	0.2122	159.16	750.05
8	0.0074	13.84	1870.27	24	0.2414	160.24	663.79
9	0.0090	17.52	1946.67	25	0.3120	162.16	519.74
10	0.0112	23.72	2117.86	26	0.4198	164.32	391.42
11	0.0136	30.16	2217.65	27	0.4580	164.84	359.91
12	0.0166	39.40	2373.49	28	0.5712	166.48	291.46
13	0.0204	53.36	2615.69	29	0.6690	167.84	250.88
14	0.0252	69.84	2771.43	30	0.8584	169.44	197.39
15	0.0308	89.84	2916.88	31	1.0264	170.52	166.13
16	0.0384	112.44	2928.13				

GRAPH POINTS

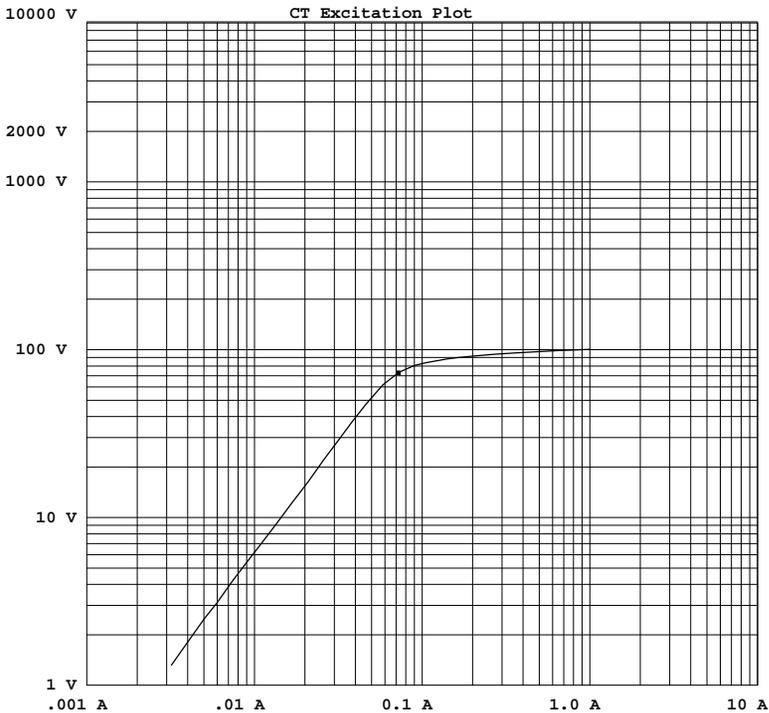
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.90	1900.00	12	0.2000	158.90	794.50
2	0.0020	3.80	1900.00	13	0.4000	164.20	410.50
3	0.0040	7.60	1900.00	14	0.5000	165.60	331.20
4	0.0050	9.50	1900.00	15	0.8000	168.90	211.13
5	0.0080	15.20	1900.00	16	1.0000	170.40	170.40
6	0.0100	20.10	2010.00	17	2.0000	174.80	87.40
7	0.0200	51.80	2590.00	18	4.0000	179.00	44.75
8	0.0400	116.70	2917.50	19	5.0000	180.20	36.04
9	0.0500	131.80	2636.00				
10	0.0800	147.70	1846.25				
11	0.1000	151.60	1516.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1500/5.0	Ex V[Volts]: 48.000	Phase Angle:0.00°
Vkp[Volts]: 72.92	Vkp[Volts]: 58.84	Vkp[Volts]: 77.92	M-RATIO: 300.376	Ex I[Amps]: 0.047	In Phase
Ikp[Amps]: 0.0722	Ikp[Amps]: 0.0560	Ikp[Amps]: 0.0836	% ERROR: 0.1253	Winding Res: 324.36 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0032	1.32	412.50	17	0.1052	83.64	795.06
2	0.0050	2.48	496.00	18	0.1396	87.96	630.09
3	0.0060	3.12	520.00	19	0.1628	89.72	551.11
4	0.0074	4.20	567.57	20	0.1986	91.60	461.23
5	0.0092	5.56	604.35	21	0.2690	93.92	349.14
6	0.0112	7.16	639.29	22	0.3074	94.72	308.13
7	0.0138	9.44	684.06	23	0.3676	95.80	260.61
8	0.0168	12.28	730.95	24	0.4648	97.00	208.69
9	0.0208	16.24	780.77	25	0.5464	97.84	179.06
10	0.0260	22.20	853.85	26	0.6690	98.92	147.86
11	0.0308	27.76	901.30	27	0.8588	99.84	116.26
12	0.0384	37.36	972.92	28	1.0026	100.52	100.26
13	0.0464	47.56	1025.00				
14	0.0584	61.76	1057.53				
15	0.0728	73.36	1007.69				
16	0.0902	80.68	894.46				

GRAPH POINTS

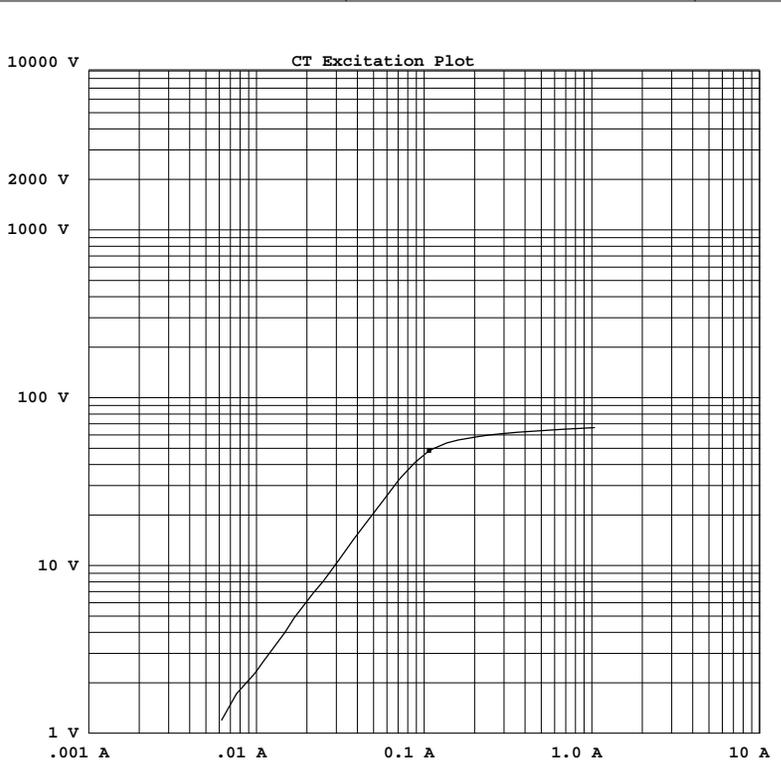
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.60	600.00	12	0.2000	92.30	461.50
2	0.0020	1.20	600.00	13	0.4000	96.50	241.25
3	0.0040	2.50	625.00	14	0.5000	97.70	195.40
4	0.0050	3.10	620.00	15	0.8000	99.70	124.63
5	0.0080	5.00	625.00	16	1.0000	100.70	100.70
6	0.0100	6.20	620.00	17	2.0000	103.40	51.70
7	0.0200	16.10	805.00	18	4.0000	105.80	26.45
8	0.0400	40.80	1020.00	19	5.0000	106.70	21.34
9	0.0500	53.20	1064.00				
10	0.0800	77.80	972.50				
11	0.1000	84.00	840.00				

FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1000/5.0	Ex V[Volts]: 32.600	Phase Angle:-0.02°
Vkp[Volts]: 48.40	Vkp[Volts]: 39.12	Vkp[Volts]: 51.96	M-RATIO: 200.267	Ex I[Amps]: 0.072	In Phase
Ikp[Amps]: 0.1072	Ikp[Amps]: 0.0840	Ikp[Amps]: 0.1260	% ERROR: 0.1336	Winding Res: 227.47 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0062	1.20	193.55	17	0.1596	55.96	350.63
2	0.0076	1.72	226.32	18	0.2142	58.92	275.07
3	0.0098	2.28	232.65	19	0.2462	60.00	243.70
4	0.0110	2.68	243.64	20	0.2982	61.20	205.23
5	0.0148	4.00	270.27	21	0.3622	62.28	171.95
6	0.0168	4.88	290.48	22	0.4430	63.16	142.57
7	0.0218	6.84	313.76	23	0.5786	64.32	111.16
8	0.0250	8.04	321.60	24	0.6828	64.92	95.08
9	0.0310	10.76	347.10	25	0.8174	65.52	80.16
10	0.0378	14.24	376.72	26	1.0358	66.36	64.07
11	0.0468	18.88	403.42				
12	0.0572	24.52	428.67				
13	0.0712	32.72	459.55				
14	0.0880	41.08	466.82				
15	0.1080	48.72	451.11				
16	0.1360	53.76	395.29				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.20	200.00	12	0.2000	59.10	295.50
2	0.0020	0.40	200.00	13	0.4000	63.10	157.75
3	0.0040	0.90	225.00	14	0.5000	64.00	128.00
4	0.0050	1.10	220.00	15	0.8000	65.70	82.13
5	0.0080	1.80	225.00	16	1.0000	66.40	66.40
6	0.0100	2.40	240.00	17	2.0000	68.20	34.10
7	0.0200	6.20	310.00	18	4.0000	69.90	17.48
8	0.0400	15.90	397.50	19	5.0000	70.30	14.06
9	0.0500	21.40	428.00				
10	0.0800	38.20	477.50				
11	0.1000	46.90	469.00				

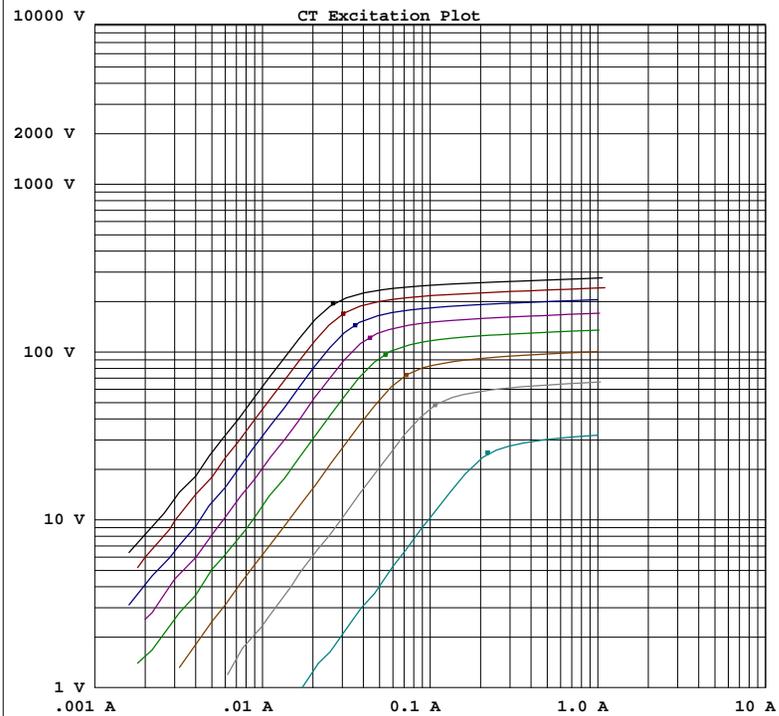
FILENAME: Piapot CTs LV (X2X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	25.16/0.2202	19.96/0.1708	26.40/0.2602	500/5.0	100.199	0.199 %	-0.08° [In Ø]	155.45 m-ohms
2	X1-X3	96.48/0.0542	78.04/0.0410	104.52/0.0642	2000/5.0	400.329	0.082 %	0.02° [In Ø]	363.38 m-ohms
3	X1-X4	144.52/0.0358	119.64/0.0284	156.12/0.0422	3000/5.0	600.366	0.061 %	0.02° [In Ø]	498.88 m-ohms
4	X1-X5	195.40/0.0264	159.20/0.0210	206.36/0.0304	4000/5.0	800.472	0.059 %	0.00° [In Ø]	666.64 m-ohms
5	X2-X3	72.92/0.0722	58.84/0.0560	77.92/0.0836	1500/5.0	300.376	0.125 %	0.00° [In Ø]	324.36 m-ohms
6	X2-X4	121.72/0.0438	101.76/0.0348	130.68/0.0502	2500/5.0	500.351	0.070 %	-0.04° [In Ø]	460.23 m-ohms
7	X2-X5	169.24/0.0304	138.48/0.0240	181.56/0.0354	3500/5.0	700.398	0.057 %	0.00° [In Ø]	627.88 m-ohms
8	X3-X4	48.40/0.1072	39.12/0.0840	51.96/0.1260	1000/5.0	200.267	0.134 %	-0.02° [In Ø]	227.47 m-ohms

Test Notepad



FILENAME: Piapot CTs LV (X2X1) - Nove

MFR:

TEST PLAN

DATE: 11/25/20 15:54:39

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT: LV CTs

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	4000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X4	3000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X3	2000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X2	500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X5	3500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X4	2500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X3	1500/5.0	[X]	[X]	[X]	500.00	1.00	
X3-X4	1000/5.0	[X]	[X]	[X]	500.00	1.00	

Burden Test []

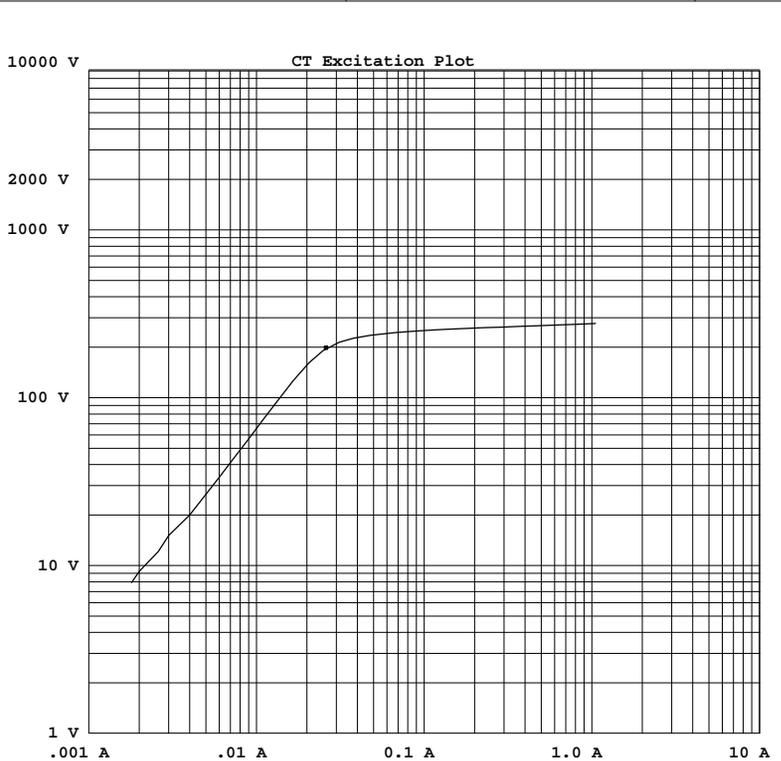
Insulation Test []

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 1: X1-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 4000/5.0	Ex V[Volts]: 130.400	Phase Angle:0.04°
Vkp[Volts]: 198.20	Vkp[Volts]: 158.76	Vkp[Volts]: 211.28	M-RATIO: 800.598	Ex I[Amps]: 0.017	In Phase
Ikp[Amps]: 0.0260	Ikp[Amps]: 0.0202	Ikp[Amps]: 0.0304	% ERROR: 0.0748	Winding Res: 643.90 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	7.92	4400.00	17	0.0480	235.92	4915.00
2	0.0020	9.24	4620.00	18	0.0678	244.84	3611.21
3	0.0026	12.12	4661.54	19	0.0830	248.64	2995.66
4	0.0030	15.08	5026.67	20	0.1086	252.96	2329.28
5	0.0040	20.00	5000.00	21	0.1330	255.64	1922.11
6	0.0050	26.60	5320.00	22	0.2312	261.60	1131.49
7	0.0060	33.56	5593.33	23	0.2928	263.76	900.82
8	0.0072	42.64	5922.22	24	0.3736	266.20	712.53
9	0.0090	56.84	6315.56	25	0.4576	268.08	585.84
10	0.0110	74.32	6756.36	26	0.5416	269.96	498.45
11	0.0136	97.96	7202.94	27	0.7218	272.68	377.78
12	0.0166	126.48	7619.28	28	0.8162	274.04	335.75
13	0.0206	161.60	7844.66	29	1.0536	277.28	263.17
14	0.0250	191.08	7643.20				
15	0.0312	214.32	6869.23				
16	0.0378	226.20	5984.13				

GRAPH POINTS

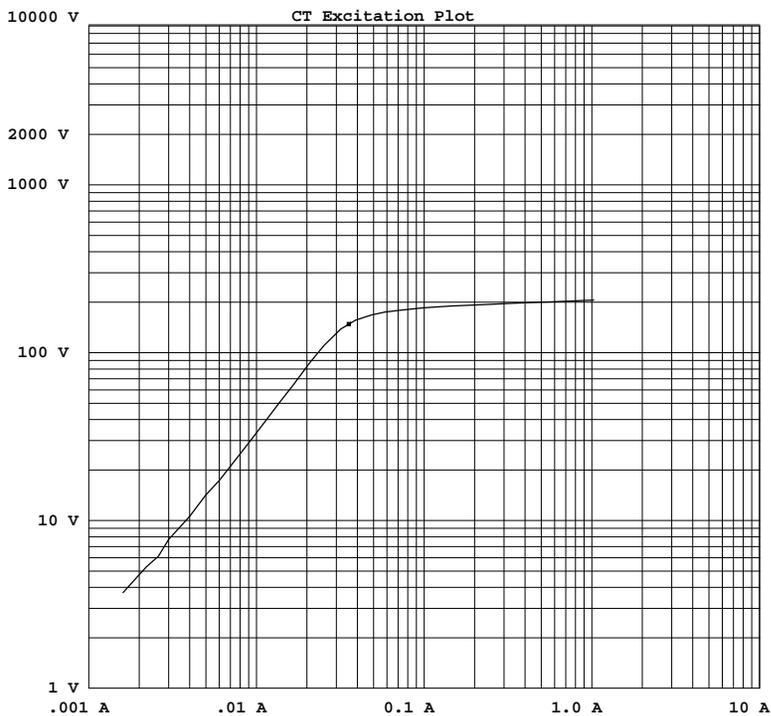
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	5.80	5800.00	12	0.2000	259.70	1298.50
2	0.0020	11.60	5800.00	13	0.4000	266.70	666.75
3	0.0040	23.20	5800.00	14	0.5000	268.90	537.80
4	0.0050	29.00	5800.00	15	0.8000	273.50	341.88
5	0.0080	46.40	5800.00	16	1.0000	276.30	276.30
6	0.0100	61.30	6130.00	17	2.0000	283.00	141.50
7	0.0200	150.80	7540.00	18	4.0000	288.80	72.20
8	0.0400	227.50	5687.50	19	5.0000	291.00	58.20
9	0.0500	235.80	4716.00				
10	0.0800	247.40	3092.50				
11	0.1000	251.00	2510.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 2: X1-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3000/5.0	Ex V[Volts]: 97.100	Phase Angle:0.00°
Vkp[Volts]: 148.00	Vkp[Volts]: 120.52	Vkp[Volts]: 159.48	M-RATIO: 600.334	Ex I[Amps]: 0.024	In Phase
Ikp[Amps]: 0.0356	Ikp[Amps]: 0.0272	Ikp[Amps]: 0.0416	% ERROR: 0.0556	Winding Res: 489.10 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	3.72	2325.00	17	0.0486	168.08	3458.44
2	0.0022	5.28	2400.00	18	0.0584	174.60	2989.73
3	0.0026	6.12	2353.85	19	0.0712	179.16	2516.29
4	0.0030	7.72	2573.33	20	0.0972	184.84	1901.65
5	0.0040	10.60	2650.00	21	0.1102	186.48	1692.20
6	0.0050	14.24	2848.00	22	0.1444	189.72	1313.85
7	0.0060	17.32	2886.67	23	0.1596	190.80	1195.49
8	0.0072	21.84	3033.33	24	0.2284	193.76	848.34
9	0.0090	29.00	3222.22	25	0.2640	195.12	739.09
10	0.0114	39.44	3459.65	26	0.3002	196.20	653.56
11	0.0136	49.92	3670.59	27	0.3938	198.36	503.71
12	0.0166	64.24	3869.88	28	0.4916	200.00	406.83
13	0.0208	87.16	4190.38	29	0.5672	201.08	354.51
14	0.0254	110.92	4366.93	30	0.7818	203.48	260.27
15	0.0318	138.36	4350.94	31	0.9052	204.84	226.29
16	0.0390	156.20	4005.13	32	1.0268	205.92	200.55

GRAPH POINTS

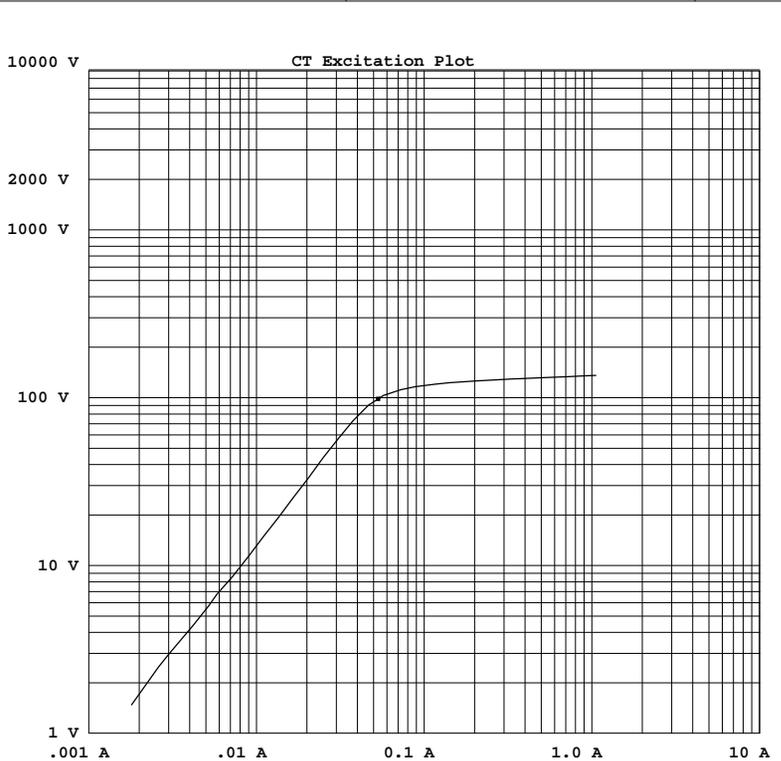
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	2.90	2900.00	12	0.2000	192.70	963.50
2	0.0020	5.80	2900.00	13	0.4000	198.20	495.50
3	0.0040	11.60	2900.00	14	0.5000	200.00	400.00
4	0.0050	14.60	2920.00	15	0.8000	203.50	254.38
5	0.0080	23.30	2912.50	16	1.0000	205.40	205.40
6	0.0100	30.80	3080.00	17	2.0000	210.80	105.40
7	0.0200	79.70	3985.00	18	4.0000	215.40	53.85
8	0.0400	155.60	3890.00	19	5.0000	217.20	43.44
9	0.0500	167.90	3358.00				
10	0.0800	181.00	2262.50				
11	0.1000	184.60	1846.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 3: X1-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2000/5.0	Ex V[Volts]: 66.400	Phase Angle:-0.02°
Vkp[Volts]: 98.40	Vkp[Volts]: 80.52	Vkp[Volts]: 104.80	M-RATIO: 400.294	Ex I[Amps]: 0.035	In Phase
Ikp[Amps]: 0.0532	Ikp[Amps]: 0.0408	Ikp[Amps]: 0.0602	% ERROR: 0.0734	Winding Res: 347.66 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	1.48	822.22	17	0.0572	103.12	1802.80
2	0.0026	2.48	953.85	18	0.0726	111.76	1539.39
3	0.0030	2.96	986.67	19	0.0886	116.36	1313.32
4	0.0042	4.40	1047.62	20	0.1172	120.52	1028.33
5	0.0052	5.76	1107.69	21	0.1416	122.84	867.51
6	0.0058	6.72	1158.62	22	0.2032	125.92	619.69
7	0.0072	8.60	1194.44	23	0.2490	127.28	511.16
8	0.0090	11.40	1266.67	24	0.3408	129.44	379.81
9	0.0110	14.88	1352.73	25	0.3680	129.72	352.50
10	0.0136	19.44	1429.41	26	0.4936	131.48	266.37
11	0.0166	25.40	1530.12	27	0.6162	132.84	215.58
12	0.0204	33.24	1629.41	28	0.7238	133.64	184.64
13	0.0250	43.92	1756.80	29	0.8610	134.60	156.33
14	0.0310	57.44	1852.90	30	1.0576	135.80	128.40
15	0.0376	72.84	1937.23				
16	0.0466	90.28	1937.34				

GRAPH POINTS

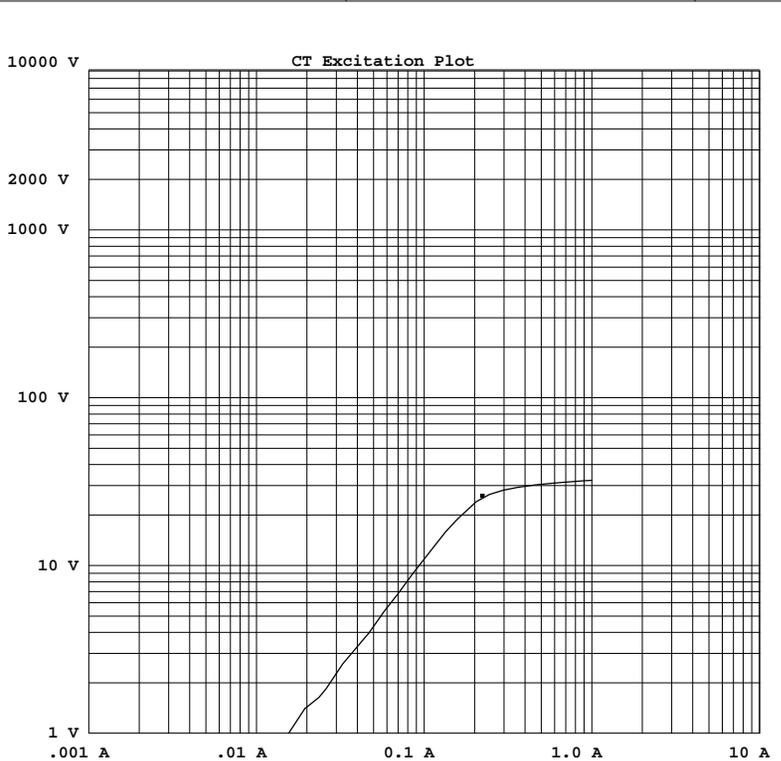
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.10	1100.00	12	0.2000	125.60	628.00
2	0.0020	2.20	1100.00	13	0.4000	130.20	325.50
3	0.0040	4.40	1100.00	14	0.5000	131.50	263.00
4	0.0050	5.60	1120.00	15	0.8000	134.00	167.50
5	0.0080	8.90	1112.50	16	1.0000	135.40	135.40
6	0.0100	11.80	1180.00	17	2.0000	139.10	69.55
7	0.0200	31.30	1565.00	18	4.0000	142.40	35.60
8	0.0400	76.10	1902.50	19	5.0000	143.20	28.64
9	0.0500	93.10	1862.00				
10	0.0800	113.60	1420.00				
11	0.1000	118.20	1182.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 4: X1-X2
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 500/5.0	Ex V[Volts]: 17.700	Phase Angle:-0.06°
Vkp[Volts]: 26.00	Vkp[Volts]: 18.72	Vkp[Volts]: 26.72	M-RATIO: 100.179	Ex I[Amps]: 0.148	In Phase
Ikp[Amps]: 0.2228	Ikp[Amps]: 0.1566	Ikp[Amps]: 0.2522	% ERROR: 0.1793	Winding Res: 156.44 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0130	0.76	58.46	17	0.3626	29.28	80.75
2	0.0194	1.40	72.16	18	0.4600	30.24	65.74
3	0.0236	1.64	69.49	19	0.5480	30.80	56.20
4	0.0260	1.84	70.77	20	0.6872	31.40	45.69
5	0.0328	2.60	79.27	21	0.8682	31.96	36.81
6	0.0448	3.76	83.93	22	1.0022	32.24	32.17
7	0.0468	3.96	84.62				
8	0.0580	5.36	92.41				
9	0.0700	6.80	97.14				
10	0.0860	9.00	104.65				
11	0.1054	11.68	110.82				
12	0.1348	15.96	118.40				
13	0.1586	19.00	119.80				
14	0.2048	24.04	117.38				
15	0.2450	26.52	108.24				
16	0.2970	28.12	94.68				

GRAPH POINTS

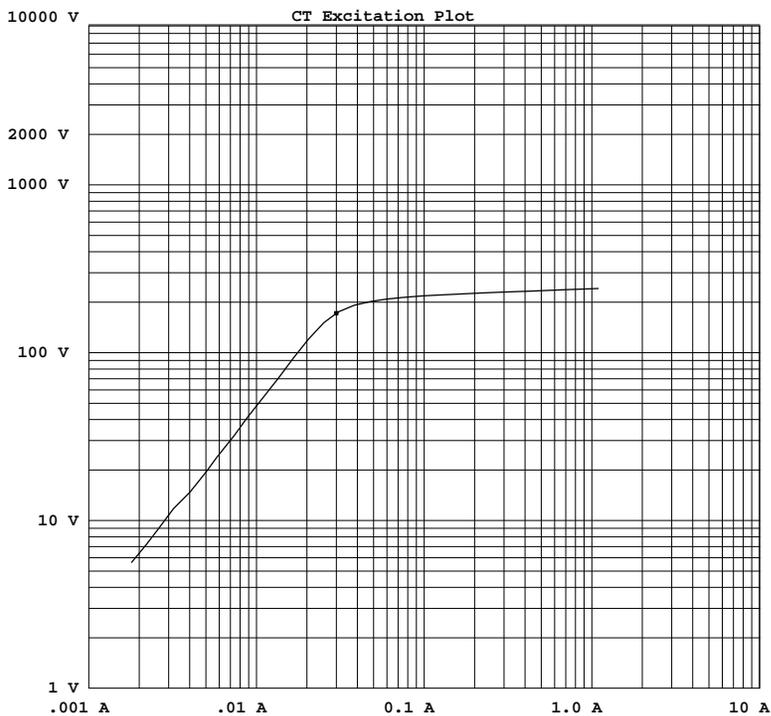
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.00	0.00	12	0.2000	23.60	118.00
2	0.0020	0.10	50.00	13	0.4000	29.60	74.00
3	0.0040	0.20	50.00	14	0.5000	30.40	60.80
4	0.0050	0.30	60.00	15	0.8000	31.70	39.63
5	0.0080	0.40	50.00	16	1.0000	32.20	32.20
6	0.0100	0.60	60.00	17	2.0000	33.30	16.65
7	0.0200	1.30	65.00	18	4.0000	34.10	8.53
8	0.0400	3.20	80.00	19	5.0000	34.20	6.84
9	0.0500	4.20	84.00				
10	0.0800	7.90	98.75				
11	0.1000	10.70	107.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 5: X2-X5
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 3500/5.0	Ex V[Volts]: 98.600	Phase Angle:0.02°
Vkp[Volts]: 171.88	Vkp[Volts]: 140.32	Vkp[Volts]: 183.92	M-RATIO: 700.507	Ex I[Amps]: 0.018	In Phase
Ikp[Amps]: 0.0300	Ikp[Amps]: 0.0236	Ikp[Amps]: 0.0346	% ERROR: 0.0725	Winding Res: 609.96 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0018	5.64	3133.33	17	0.0478	201.88	4223.43
2	0.0022	7.16	3254.55	18	0.0592	208.64	3524.32
3	0.0026	8.92	3430.77	19	0.0732	213.24	2913.11
4	0.0032	11.76	3675.00	20	0.0960	218.08	2271.67
5	0.0040	14.72	3680.00	21	0.1120	219.72	1961.79
6	0.0050	19.40	3880.00	22	0.2214	227.28	1026.56
7	0.0058	23.80	4103.45	23	0.2876	229.72	798.75
8	0.0074	32.28	4362.16	24	0.3676	231.88	630.79
9	0.0088	40.96	4654.55	25	0.4434	233.24	526.03
10	0.0112	55.48	4953.57	26	0.5468	235.40	430.50
11	0.0136	71.08	5226.47	27	0.7550	238.36	315.71
12	0.0166	92.84	5592.77	28	0.8618	239.44	277.84
13	0.0204	120.40	5901.96	29	1.0934	241.60	220.96
14	0.0252	150.80	5984.13				
15	0.0308	175.12	5685.71				
16	0.0384	192.16	5004.17				

GRAPH POINTS

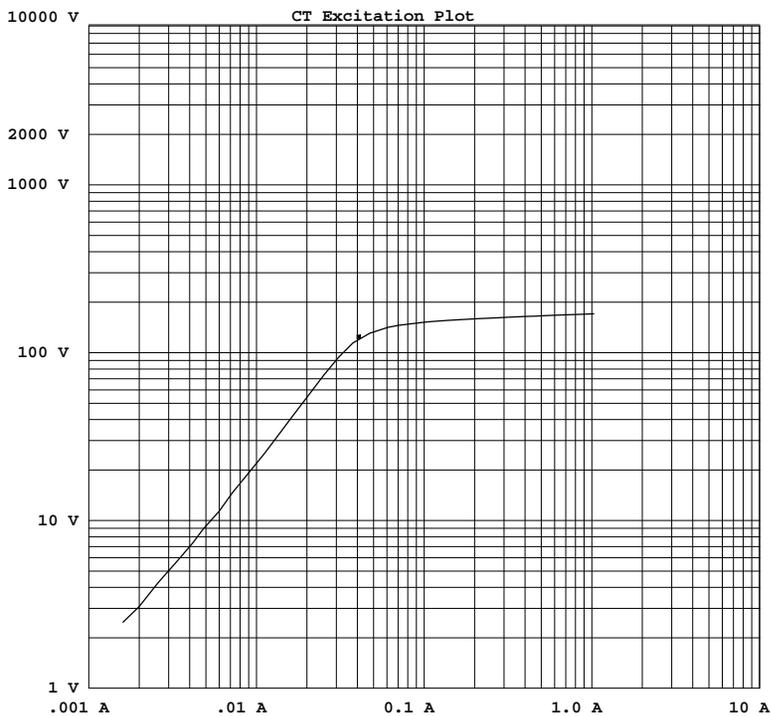
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	4.10	4100.00	12	0.2000	226.00	1130.00
2	0.0020	8.30	4150.00	13	0.4000	232.40	581.00
3	0.0040	16.60	4150.00	14	0.5000	234.30	468.60
4	0.0050	20.70	4140.00	15	0.8000	238.70	298.37
5	0.0080	33.20	4150.00	16	1.0000	240.60	240.60
6	0.0100	43.40	4340.00	17	2.0000	246.80	123.40
7	0.0200	114.30	5715.00	18	4.0000	252.20	63.05
8	0.0400	192.30	4807.50	19	5.0000	253.70	50.74
9	0.0500	202.60	4052.00				
10	0.0800	214.10	2676.25				
11	0.1000	217.90	2179.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 6: X2-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 2500/5.0	Ex V[Volts]: 78.000	Phase Angle:0.02°
Vkp[Volts]: 124.40	Vkp[Volts]: 104.48	Vkp[Volts]: 132.52	M-RATIO: 500.313	Ex I[Amps]: 0.027	In Phase
Ikp[Amps]: 0.0408	Ikp[Amps]: 0.0338	Ikp[Amps]: 0.0494	% ERROR: 0.0626	Winding Res: 455.14 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0016	2.48	1550.00	17	0.0474	130.80	2759.49
2	0.0020	3.08	1540.00	18	0.0608	141.60	2328.95
3	0.0026	4.28	1646.15	19	0.0706	145.68	2063.46
4	0.0034	5.80	1705.88	20	0.0996	151.88	1524.90
5	0.0042	7.40	1761.90	21	0.1092	153.24	1403.30
6	0.0048	8.88	1850.00	22	0.1394	155.92	1118.51
7	0.0060	11.40	1900.00	23	0.2036	159.44	783.10
8	0.0072	14.68	2038.89	24	0.2734	161.60	591.08
9	0.0090	19.24	2137.78	25	0.3078	162.44	527.75
10	0.0112	25.16	2246.43	26	0.4142	164.60	397.39
11	0.0138	33.24	2408.70	27	0.4532	165.12	364.34
12	0.0166	42.44	2556.63	28	0.5630	166.76	296.20
13	0.0208	57.16	2748.08	29	0.6714	167.84	249.99
14	0.0252	73.64	2922.22	30	0.8610	169.44	196.79
15	0.0310	94.20	3038.71	31	1.0280	170.52	165.88
16	0.0376	114.32	3040.43				

GRAPH POINTS

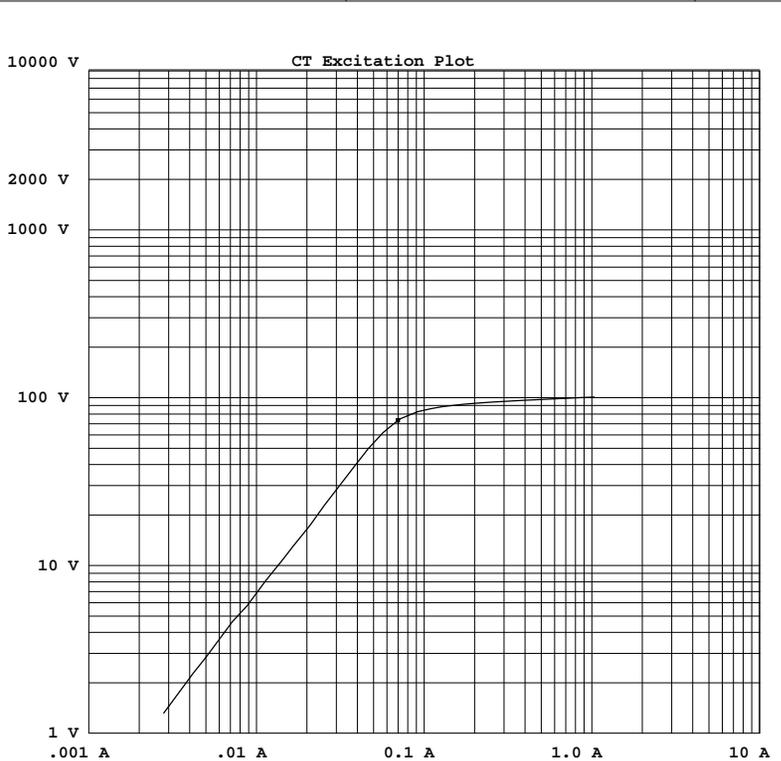
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	1.90	1900.00	12	0.2000	158.90	794.50
2	0.0020	3.80	1900.00	13	0.4000	164.20	410.50
3	0.0040	7.60	1900.00	14	0.5000	165.60	331.20
4	0.0050	9.50	1900.00	15	0.8000	168.90	211.13
5	0.0080	15.20	1900.00	16	1.0000	170.40	170.40
6	0.0100	20.10	2010.00	17	2.0000	174.80	87.40
7	0.0200	51.80	2590.00	18	4.0000	179.00	44.75
8	0.0400	116.70	2917.50	19	5.0000	180.20	36.04
9	0.0500	131.80	2636.00				
10	0.0800	147.70	1846.25				
11	0.1000	151.60	1516.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 7: X2-X3
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1500/5.0	Ex V[Volts]: 48.000	Phase Angle:-0.08°
Vkp[Volts]: 73.28	Vkp[Volts]: 59.32	Vkp[Volts]: 79.68	M-RATIO: 300.265	Ex I[Amps]: 0.046	In Phase
Ikp[Amps]: 0.0698	Ikp[Amps]: 0.0546	Ikp[Amps]: 0.0840	% ERROR: 0.0884	Winding Res: 313.79 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0028	1.32	471.43	17	0.0916	82.68	902.62
2	0.0042	2.28	542.86	18	0.1112	86.36	776.62
3	0.0050	2.84	568.00	19	0.1296	88.52	683.02
4	0.0064	3.96	618.75	20	0.1736	91.60	527.65
5	0.0072	4.64	644.44	21	0.2150	93.12	433.12
6	0.0088	5.76	654.55	22	0.2522	94.20	373.51
7	0.0114	8.16	715.79	23	0.3440	95.92	278.84
8	0.0144	10.88	755.56	24	0.4016	96.60	240.54
9	0.0166	13.08	787.95	25	0.4438	97.16	218.93
10	0.0208	17.28	830.77	26	0.5582	98.24	175.99
11	0.0254	22.80	897.64	27	0.7010	99.32	141.68
12	0.0308	29.24	949.35	28	0.8418	100.00	118.79
13	0.0378	38.16	1009.52	29	1.0338	100.92	97.62
14	0.0464	49.64	1069.83				
15	0.0568	61.96	1090.85				
16	0.0712	74.60	1047.75				

GRAPH POINTS

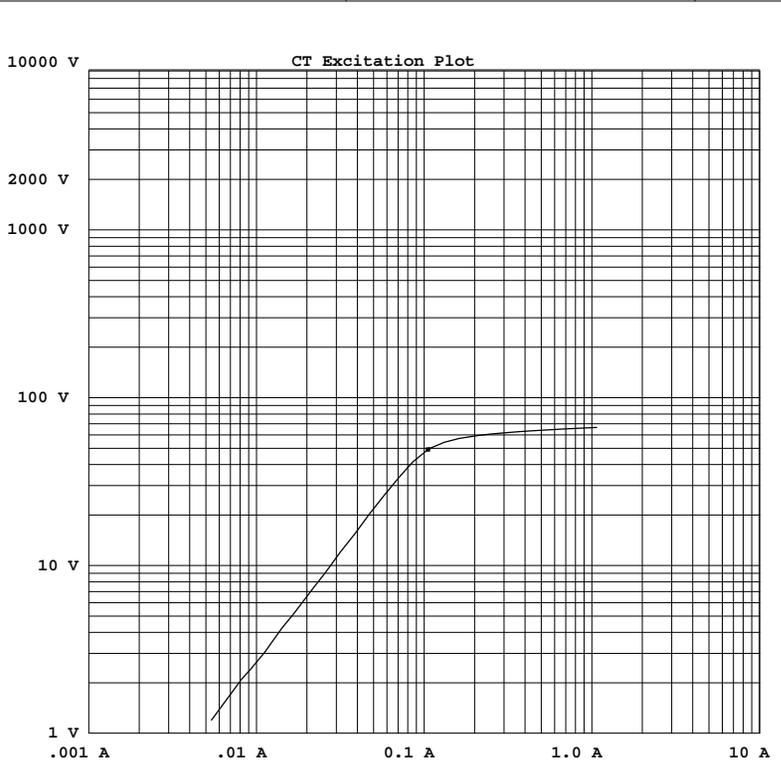
POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.60	600.00	12	0.2000	92.30	461.50
2	0.0020	1.20	600.00	13	0.4000	96.50	241.25
3	0.0040	2.50	625.00	14	0.5000	97.70	195.40
4	0.0050	3.10	620.00	15	0.8000	99.70	124.63
5	0.0080	5.00	625.00	16	1.0000	100.70	100.70
6	0.0100	6.20	620.00	17	2.0000	103.40	51.70
7	0.0200	16.10	805.00	18	4.0000	105.80	26.45
8	0.0400	40.80	1020.00	19	5.0000	106.70	21.34
9	0.0500	53.20	1064.00				
10	0.0800	77.80	972.50				
11	0.1000	84.00	840.00				

FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

TEST # 8: X3-X4
 TEST NOTES:
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

IEEE 30	IEEE 45	IEC 10/50	NP-RATIO: 1000/5.0	Ex V[Volts]: 33.100	Phase Angle:-0.06°
Vkp[Volts]: 49.12	Vkp[Volts]: 39.84	Vkp[Volts]: 52.44	M-RATIO: 200.265	Ex I[Amps]: 0.070	In Phase
Ikp[Amps]: 0.1054	Ikp[Amps]: 0.0826	Ikp[Amps]: 0.1220	% ERROR: 0.1324	Winding Res: 231.30 milliohms	



CT DATA POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0054	1.20	222.22	17	0.1624	57.28	352.71
2	0.0082	2.12	258.54	18	0.2092	59.52	284.51
3	0.0092	2.40	260.87	19	0.2518	60.80	241.46
4	0.0112	3.04	271.43	20	0.3082	61.96	201.04
5	0.0142	4.24	298.59	21	0.3744	62.84	167.84
6	0.0166	5.12	308.43	22	0.4422	63.52	143.65
7	0.0222	7.52	338.74	23	0.5542	64.40	116.20
8	0.0258	9.08	351.94	24	0.6734	65.08	96.64
9	0.0316	12.00	379.75	25	0.8378	65.80	78.54
10	0.0388	15.52	400.00	26	1.0686	66.56	62.29
11	0.0470	20.20	429.79				
12	0.0572	25.92	453.15				
13	0.0704	33.28	472.73				
14	0.0856	41.40	483.64				
15	0.1068	49.64	464.79				
16	0.1322	54.32	410.89				

GRAPH POINTS

POINT	CUR(A)	VTG(V)	Z(OHM)	POINT	CUR(A)	VTG(V)	Z(OHM)
1	0.0010	0.20	200.00	12	0.2000	59.10	295.50
2	0.0020	0.40	200.00	13	0.4000	63.10	157.75
3	0.0040	0.90	225.00	14	0.5000	64.00	128.00
4	0.0050	1.10	220.00	15	0.8000	65.70	82.13
5	0.0080	1.80	225.00	16	1.0000	66.40	66.40
6	0.0100	2.40	240.00	17	2.0000	68.20	34.10
7	0.0200	6.20	310.00	18	4.0000	69.90	17.48
8	0.0400	15.90	397.50	19	5.0000	70.30	14.06
9	0.0500	21.40	428.00				
10	0.0800	38.20	477.50				
11	0.1000	46.90	469.00				

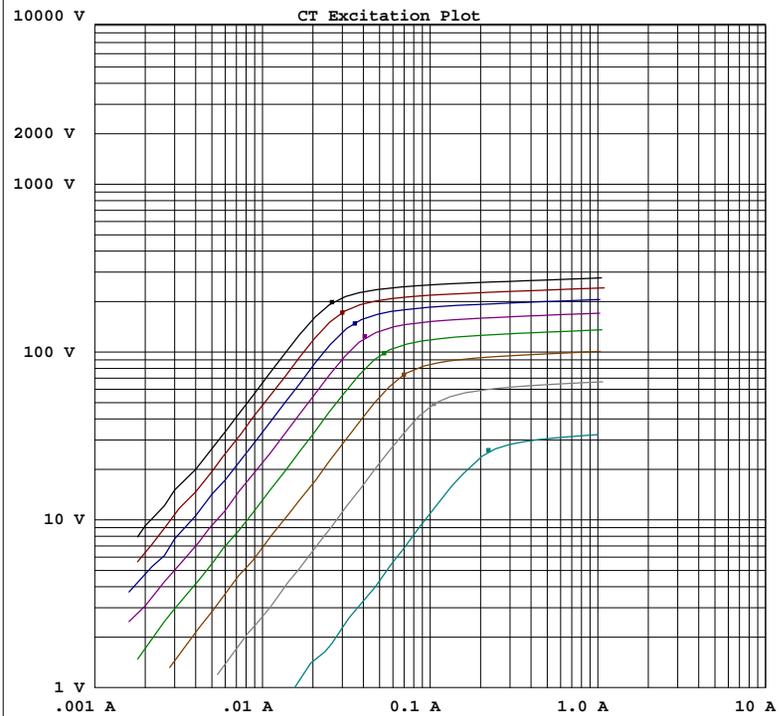
FILENAME: Piapot CTs LV (X3X1) - Nove
 DATE: 11/25/20 15:54:39
 COMPANY: TCE
 STATION: Piapot
 CIRCUIT: LV CTs

MFR:
 MODEL:
 SN:
 OPERATOR: JR
 COMMENTS:

SUMMARY REPORT
 KNEE TYPE: IEEE 30 Deg
 FREQUENCY: 60 Hz

Test	Tap	IEEE30(V/I)	IEEE45(V/I)	IEC 10/50(V/I)	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	26.00/0.2228	18.72/0.1566	26.72/0.2522	500/5.0	100.179	0.179 %	-0.06° [In Ø]	156.44 m-ohms
2	X1-X3	98.40/0.0532	80.52/0.0408	104.80/0.0602	2000/5.0	400.294	0.073 %	-0.02° [In Ø]	347.66 m-ohms
3	X1-X4	148.00/0.0356	120.52/0.0272	159.48/0.0416	3000/5.0	600.334	0.056 %	0.00° [In Ø]	489.10 m-ohms
4	X1-X5	198.20/0.0260	158.76/0.0202	211.28/0.0304	4000/5.0	800.598	0.075 %	0.04° [In Ø]	643.90 m-ohms
5	X2-X3	73.28/0.0698	59.32/0.0546	79.68/0.0840	1500/5.0	300.265	0.088 %	-0.08° [In Ø]	313.79 m-ohms
6	X2-X4	124.40/0.0408	104.48/0.0338	132.52/0.0494	2500/5.0	500.313	0.063 %	0.02° [In Ø]	455.14 m-ohms
7	X2-X5	171.88/0.0300	140.32/0.0236	183.92/0.0346	3500/5.0	700.507	0.072 %	0.02° [In Ø]	609.96 m-ohms
8	X3-X4	49.12/0.1054	39.84/0.0826	52.44/0.1220	1000/5.0	200.265	0.132 %	-0.06° [In Ø]	231.30 m-ohms

Test Notepad



FILENAME: Piapot CTs LV (X3X1) - Nove

MFR:

TEST PLAN

DATE: 11/25/20 15:54:39

MODEL:

TEST NOTES:

COMPANY: TCE

SN:

KNEE TYPE: IEEE 30 Deg

STATION: Piapot

OPERATOR: JR

FREQUENCY: 60 Hz

CIRCUIT: LV CTs

COMMENTS:

	Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage (V)	Excitation Current (A)	Note
X1-X5	4000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X4	3000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X3	2000/5.0	[X]	[X]	[X]	500.00	1.00	
X1-X2	500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X5	3500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X4	2500/5.0	[X]	[X]	[X]	500.00	1.00	
X2-X3	1500/5.0	[X]	[X]	[X]	500.00	1.00	
X3-X4	1000/5.0	[X]	[X]	[X]	500.00	1.00	

Burden Test []

Insulation Test []



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Appendix H: Parts List

SIEMENS TRANSFORMADORES S.A. DE C.V.

PACKING LIST/LISTA DE EMBARQUE

SIEMENS TRANSFORMADORES S.A. DE C.V. KM. 8 CARRETERA GUANAJUATO-SILAO GUANAJUATO, GTO.	NUMBER NUMERO	DATE: FECHA:	14/06/2011
		REV. 1	
	P.O. O. FABRICACION:	TP-1092.03	
	SHIPPED TO: EMBARCADO A:	TRANSCANADA PIPELINE LIMITED PIAPOT PUMPING STATION SW 27-11-22 W3M	
	CONTRACT N°: No. CONTRATO:	9000017832.00	

BOX CAJA	OUTLINE PARTIDA	MEASURE UNIDAD	QUANTITY CANTIDAD	DESCRIPTION DESCRIPCION	LENGTH LARGO	WIDTH ANCHO	HEIGHT ALTO	WEIGHT PESO
2	1	PC	1	HV. BUSHING ABB BREAND, 230KV CLASS, 1050KV BIL, 800 AMP, STYLE: 230W0800VT SERIAL H1: 1000024431.	132"	21"	24"	450
3	1	PC	1	HV. BUSHING ABB BREAND, 230KV CLASS, 1050KV BIL, 800 AMP, STYLE: 230W0800VT SERIAL H2: 1000024432.	132"	21"	24"	450
4	1	PC	1	HV. BUSHING ABB BREAND, 230KV CLASS, 1050KV BIL, 800 AMP, STYLE: 230W0800VT SERIAL H: 1000024433.	132"	21"	24"	450
5	2	PC	3	L.V. BUSHING ABB BRAND, 15 KV CLASS, 110 KV BIL, 4000 AMP. STYLE: 015J0400AN SERIAL X1: 1000025096, X2: 1000025097, X3: 1000025098.	81"	38"	39"	350
	3	PC	1	NEUTRAL BUSHING ABB BRAND, 15 KV CLASS, 110 KV BIL, 4000 AMP. STYLE: 015J0400AN SERIAL X0: 1000025096.				
6	17	PC	4	THREADED STAINLESS STEEL BOLT 3/4 " X 1025 mm FOR SUPPORT BETWEEN RADIATORS (ANTISEISMIC), WITH INTEGRATED SCREWS.	79"	32"	36"	850
		PC	2	Fø ANGLE FOR SUPPORT BETWEEN RADIATORS (ANTISEISMIC).				
	17	PC	8	THREADED STAINLESS STEEL BOLT 3/4 " X 1025 mm FOR SUPPORT BETWEEN RADIATORS (ANTISEISMIC), WITH INTEGRATED SCREWS.				
	57	PC	4	Fø ANGLE FOR SUPPORT BETWEEN RADIATORS (ANTISEISMIC).				
	54	PC	3	DISCHANGER COUNTER, OHIO BRASS				
	53	PC	9	VICTOR INSULATOR'S				
	55	PC	1	H.V. LIGHTNING GROUNDING CONNECTION; 4/0 AWG & COPPER BUS BAR 1/4" X 2" X 20 1/4".				
	1	PC	3	EXTERNAL CONNECTOR; DELTA BRAND. CAT: PM59C12-1-412-E. FOR HV BUSHING'S				
	2,3	PC	4	EXTERNAL CONNECTOR; DELTA BRAND. CAT: CC4P6225C12-90-E. FOR LV & NEUTRAL BUSHING'S				
	54	PC	3	H.V. LIGHTNING GROUNDING CONNECTION; 4/0 AWG.				
				GASKETS				
	1	PC	3	"O"RING, COLOR BLACK.18.455" Ø X 1/4" THK. (HV BUSHINGS).				
	1	PC	3	"O"RING, COLOR BLACK.20.955" Ø X 1/4" THK. (HV FLANGE'S).				
	2,3	PC	4	"O"RING VITON, COLOR ORANGE. 6.725" Ø X 1/4" THK. (LV BUSHINGS).				
	9	PC	3	RECTANGULAR GASKET 503/529 MM X 3/8" THK (MANHOLES "B" COVER)				
	10,11	PC	2	RECTANGULAR GASKET 503/529 MM X 3/8" THK (MANHOLES "B" SEGM. 3 & 4)				
	16	PC	14	"O"RING, COLOR BLACK. 5 1/4" Ø X 1/4" THK. (RADIADOR VALVE).				
	15	PC	1	"O"RING, COLOR BLACK. 7 1/2" Ø X 3/16" THK. (PRESURE RELIEF VALVE).				
				"EXTRA STAINLESS STEEL HARDWARE"				
	1	SET	2	BOLT 1" X 2 1/4", WITH FLAT AND LOCK WASHER (HV BUSHING SUPPORT)				
1	SET	5	BOLT 1/2" X 3", WITH 2 FLAT WASHER, 1 LOCK WASHER AND 1 BRONZE NUT(HV FLANGE'S)					
2	SET	2	BOLT 1/2" X 1 1/4", WITH FLAT AND LOCK WASHER (LV BUSHING SUPPORT)					
2	SET	4	BOLT 1/2" X 2", WITH 2 FLAT WASHER, 1 LOCK WASHER AND 1 BRONZE NUT(LV BUSHINGS BOX)					
	SET	5	BOLT 3/4" X 2", WITH FLAT WASHER, AND LOCK WASHER (RADIATOR VALVE)					
	SET	2	BOLT 3/4" X 2 1/2", WITH 2 FLAT WASHER, 1 LOCK WASHER AND 1 BRONZE NUT(HV LIGHTNING ARRESTERS SUPPORT)					
	SET	15	BRONZE NUT 1/2" WITH FLAT AND LOCK WASHER (MANHOLES & L.V. BOX.)					
7	15	PC	3	RADIATOR DETACHABLE (HOT DIP GALVANIZED). WITH 1" DIA. GLOBE VALVE FOR DRAIN & VENT 2 PCS.	118"	86"	71"	3,600
	69	PC	4	COOLING FANS, 208/230 VOLTS, 1750 RPM, 1/2 HP, PH 3; BRAND: KRENZ-VENT				
8	16	PC	2	RADIATOR DETACHABLE (HOT DIP GALVANIZED). WITH 1" DIA. GLOBE VALVE FOR DRAIN & VENT 2 PCS.	118"	73"	71"	2,500
	69	PC	4	COOLING FANS, 208/230 VOLTS, 1750 RPM, 1/2 HP, PH 3; BRAND: KRENZ-VENT				
9	16	PC	2	RADIATOR DETACHABLE (HOT DIP GALVANIZED). WITH 1" DIA. GLOBE VALVE FOR DRAIN & VENT 2 PCS.	118"	73"	71"	2,500
	69	PC	4	COOLING FANS, 208/230 VOLTS, 1750 RPM, 1/2 HP, PH 3; BRAND: KRENZ-VENT				
10		PC	6	H.V. LIGHTNING ARRESTERS 192 KV. RATING; 152 KV. MCOV; CAT: 217752; OHIO BRASS BRAND. SERIAL # S-96863; S-96864; S-96865; S-96866; S-96867; S-96868. WITH O'RING	59"	48"	48"	600
		PC	1	HV LIGHTNING ARRESTERS SUPPORT.				

	PC	1	BRACKET DETACHABLE FOR H.V. LIGHTNING ARRESTERS SUPPORT WITH 2 Fe ANGLE	168"	65"	107"	850
12	PC	1	L.V. JUNCTION BOX DETACHABLE	87"	42"	40"	300



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Appendix I: Test Equipment – Calibration Certificates



Certificate of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca



For Instrument : Vanguard WRM-10

Description : Transformer Resistance Meter

Serial Number : 97236

Asset Number : RF 13

Customer: Shermco - Regina

1033 Kearns Cres.

Regina, SK

S4P 3B2

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

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Quality Management system registered to ISO 9001: 2015

CALIBRATION INFORMATION

Cal Date: 4 Mar 2020

Temperature 20.0°C

Condition as Received/Returned: IN TOLERANCE

Next Cal Due: 4 Mar 2021

Humidity 40 %

(Pass)

Remarks:

Cal Procedure Vanguard WRM-10

Revision 1.0

STANDARDS USED FOR CALIBRATION

<u>Asset Number</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
101294	Burster 1282-0.001 1 mOhm Standard Resistor	03 May 2019	03 May 2020
101295	Burster 1282-0.01 10 mOhm Standard Resistor	03 May 2019	03 May 2020
101296	Burster 1282-0.1 100 mOhm Standard Resistor	03 May 2019	03 May 2020
SR2	YEW 2792 1 ohm Resistor	19 Feb 2020	19 Feb 2021
SR3	YEW 2792 1000 ohm Resistor	19 Feb 2020	19 Feb 2021
SR4	YEW 2892 100 ohm Resistor	19 Feb 2020	19 Feb 2021



Signed: _____

Edwin Zhang - Technician

SERIAL NUMBER: 97236

ASSET NUMBER: RF 13

Report of Calibration

The CAT Rental Store
 Wirtanen Division
 10235 - 180 Street Edmonton, AB T5L 3B2
 PHONE: (780) 434-8421
 www.catrents.ca

UNIT UNDER TEST:	Vanguard WRM-10 Transformer Resistance Meter	TEST RESULT:	PASS
SERIAL NUMBER:	97236	PERFORMED ON:	04 March 2020
ASSET NUMBER:	RF 13	DATA TYPE:	FOUND-LEFT
PROCEDURE NAME:	Vanguard WRM-10	TEMPERATURE:	20.00 °C
PROCEDURE REV.:	1.0	HUMIDITY:	40 %
CALIBRATED BY:	Edwin Zhang		
P.O. NUMBER:			
CUSTOMER:	Shermco - Regina 1033 Kearns Cres. Regina, SK S4P 3B2		

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted). It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

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Note: Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

REMARKS:

Standards Used

<u>Asset #</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
101294	Burster 1282-0.001 1 mOhm Standard Resistor	5/3/2019	5/3/2020
101295	Burster 1282-0.01 10 mOhm Standard Resistor	5/3/2019	5/3/2020
101296	Burster 1282-0.1 100 mOhm Standard Resistor	5/3/2019	5/3/2020
SR2	YEW 2792 1 ohm Resistor	2/19/2020	2/19/2021
SR3	YEW 2792 1000 ohm Resistor	2/19/2020	2/19/2021
SR4	YEW 2892 100 ohm Resistor	2/19/2020	2/19/2021

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
Display Test		Y				Pass
V1	1.000	1.004	0.994	1.006	mΩ	Pass
	10.00	10.03	9.94	10.06	mΩ	Pass
	100.0	100.3	98.9	101.1	mΩ	Pass
	1.000	1.010	0.984	1.016	Ω	Pass
	100.00	100.30	98.40	101.60	Ω	Pass
	1000.00	1003.00	984.00	1016.00	Ω	Pass
V2	1.000	1.004	0.994	1.006	mΩ	Pass

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
	10.00	10.03	9.94	10.06	mΩ	Pass
	100.0	100.4	98.9	101.1	mΩ	Pass
	1.000	1.010	0.984	1.016	Ω	Pass
	100.00	100.20	98.40	101.60	Ω	Pass
	1000.00	998.50	984.00	1016.00	Ω	Pass
Current Output	10	8.741	8.0	12.0	ADC	Pass

***** End of Certificate *****

Technician



Edwin Zhang - Technician



Certificate of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca



For Instrument : Raytech TR-Spy Mark II
Description : Transformer Ratio Tester
Serial Number : 03544
Asset Number : RF 23

Customer: Shermco - Regina
1033 Kearns Cres.
Regina, SK
S4P 3B2

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

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Quality Management system registered to ISO 9001: 2015

CALIBRATION INFORMATION

Cal Date: 9 Mar 2020 Temperature 20.0°C Condition as Received/Returned: IN TOLERANCE
Next Cal Due: 9 Mar 2021 Humidity 40 % (Pass)
Remarks:
Cal Procedure Raytech TR-SPY Mark II Transformer Turns Ratiometer Revision 1.0

STANDARDS USED FOR CALIBRATION

Asset Number	Description	Cal Date	Due Date
49001	Megger 550555 TTR Calibration Standard	17 Sep 2019	17 Sep 2020
IW5447	Fluke 89IV Multimeter	11 Oct 2019	11 Oct 2020
SR4	YEW 2892 100 ohm Resistor	19 Feb 2020	19 Feb 2021



Signed: _____

Edwin Zhang - Technician

SERIAL NUMBER: 03544

ASSET NUMBER: RF 23

Report of Calibration

The CAT Rental Store
 Wirtanen Division
 10235 - 180 Street Edmonton, AB T5L 3B2
 PHONE: (780) 434-8421
 www.catrents.ca

UNIT UNDER TEST:	Raytech TR-Spy Mark II Transformer Ratio Tester	TEST RESULT:	PASS
SERIAL NUMBER:	03544	PERFORMED ON:	09 March 2020
ASSET NUMBER:	RF 23	DATA TYPE:	FOUND-LEFT
PROCEDURE NAME:	Raytech TR-SPY Mark II Transformer Turns Ratiometer	TEMPERATURE:	20.00 °C
PROCEDURE REV.:	1.0	HUMIDITY:	40 %
CALIBRATED BY:	Edwin Zhang		
P.O. NUMBER:			
CUSTOMER:	Shermco - Regina 1033 Kearns Cres. Regina, SK S4P 3B2		

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Note: Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

REMARKS:

Standards Used

Asset #	Description	Cal Date	Due Date
49001	Megger 550555 TTR Calibration Standard	9/17/2019	9/17/2020
IW5447	Fluke 89IV Multimeter	10/11/2019	10/11/2020
SR4	YEW 2892 100 ohm Resistor	2/19/2020	2/19/2021

Test Results

Test Description	True Value	Test Result	Lower limit	Upper limit	Units	TUR
10V	1.0000	1.0000	0.8500	1.1500	Ratio	Pass
	2.0000	1.9984	1.7000	2.3000	Ratio	Pass
	5.0000	5.0011	4.2500	5.7500	Ratio	Pass
	10.000	9.998	8.500	11.500	Ratio	Pass
	20.000	20.001	17.000	23.000	Ratio	Pass
	50.000	50.020	42.500	57.500	Ratio	Pass
	100.00	100.04	85.00	115.00	Ratio	Pass
	200.00	200.10	170.00	230.00	Ratio	Pass
	500.00	500.22	425.00	575.00	Ratio	Pass
	1000.0	1000.6	850.0	1150.0	Ratio	Pass
40V	2000.0	2002.7	1700.0	2300.0	Ratio	Pass

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
	1.0000	1.0001	0.9992	1.0008	Ratio	Pass
	2.0000	1.9984	1.9984	2.0016	Ratio	Pass
	5.0000	5.0001	4.9960	5.0040	Ratio	Pass
	10.000	9.997	9.992	10.008	Ratio	Pass
	20.000	20.003	19.984	20.016	Ratio	Pass
	50.000	50.007	49.960	50.040	Ratio	Pass
	100.00	100.02	99.92	100.08	Ratio	Pass
	200.00	200.08	199.84	200.16	Ratio	Pass
	500.00	500.16	499.60	500.40	Ratio	Pass
	1000.0	1000.5	999.2	1000.8	Ratio	Pass
	2000.0	2001.4	1998.4	2001.6	Ratio	Pass
Phase						
1.5		1.5				
-1.5		-1.7				
AC Amps						
100V, 100 Ohm		243				
40V, 100 Ohm		88				

***** End of Certificate *****

Technician



Edwin Zhang - Technician



Certificate of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca



For Instrument : Megger BM5200

Customer: Shermco - Regina

Description : 5kV Insulation Tester

1033 Kearns Cres.

Serial Number : 101485610

Regina, SK

Asset Number : RF 66

S4P 3B2

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

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Quality Management system registered to ISO 9001: 2015

CALIBRATION INFORMATION

Cal Date: 3 Jun 2020 Temperature 20.2°C Condition as Received/Returned: IN TOLERANCE
Next Cal Due: 3 Jun 2021 Humidity 35 % (Pass)

Remarks:

Cal Procedure Megger BM5200 5kV Insulation Tester

Revision 1.0

STANDARDS USED FOR CALIBRATION

<u>Asset Number</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
31922	Fluke 5520A Calibrator	21 May 2020	21 May 2021
IW5210	Fluke 80K-40 HV Probe	05 Dec 2019	05 Dec 2020
IW5702	WECO 1M-100G Resistance Box	30 Aug 2019	30 Aug 2020
TCRS AA00009827	Fluke 89IV RMS Multimeter	08 Nov 2019	08 Nov 2020



Signed: _____

Justin Smith - Technician

Report of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca

UNIT UNDER TEST:	Megger BM5200 5kV Insulation Tester	TEST RESULT:	PASS
SERIAL NUMBER:	101485610	PERFORMED ON:	03 June 2020
ASSET NUMBER:	RF 66	DATA TYPE:	FOUND-LEFT
PROCEDURE NAME:	Megger BM5200 5kV Insulation Tester	TEMPERATURE:	20.20 °C
PROCEDURE REV.:	1.0	HUMIDITY:	35 %
CALIBRATED BY:	Justin Smith		
P.O. NUMBER:			
CUSTOMER:	Shermco - Regina 1033 Kearns Cres. Regina, SK S4P 3B2		

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Note: Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

REMARKS:

Standards Used

<u>Asset #</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
31922	Fluke 5520A Calibrator	5/21/2020	5/21/2021
IW5210	Fluke 80K-40 HV Probe	12/5/2019	12/5/2020
IW5702	WECO 1M-100G Resistance Box	8/30/2019	8/30/2020
TCRS AA00009827	Fluke 89IV RMS Multimeter	11/8/2019	11/8/2020

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
VDC IN						
	120.0	120.0	113.4	126.6	V	Pass
	360.0	361.0	346.2	373.8	V	Pass
	590.0	591.0	569.3	610.7	V	Pass
VAC IN (60Hz)						
	120.0	120.0	113.4	126.6	V	Pass
	360.0	360.0	346.2	373.8	V	Pass
	590.0	592.0	569.3	610.7	V	Pass
VDC OUT						
	264.0	265.1	264.0	276.5	V	Pass
	523.0	526.0	523.0	548.0	V	Pass
	1036.0	1040.1	1036.0	1086.0	V	Pass

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
250V	2570.0	2577.2	2570.0	2695.0	V	Pass
	5160.0	5168.5	5160.0	5410.0	V	Pass
500V	1.0	1.0	0.7	1.3	MΩ	Pass
	9.9	10.0	9.2	10.6	MΩ	Pass
	50.2	50.3	47.5	52.9	MΩ	Pass
	100.2	100.3	95.0	105.4	MΩ	Pass
	1.0	1.0	0.7	1.3	GΩ	Pass
	10.0	11.1	8.7	11.3	GΩ	Pass
1000V	1.0	1.0	0.7	1.3	MΩ	Pass
	9.9	9.9	9.2	10.6	MΩ	Pass
	50.2	50.2	47.5	52.9	MΩ	Pass
	100.2	100.3	95.0	105.4	MΩ	Pass
	1.0	1.0	0.9	1.1	GΩ	Pass
	10.0	10.4	9.1	10.9	GΩ	Pass
2500V	1.0	1.0	0.7	1.3	MΩ	Pass
	9.9	10.0	9.2	10.6	MΩ	Pass
	50.2	50.2	47.5	52.9	MΩ	Pass
	100.2	100.5	95.0	105.4	MΩ	Pass
	1.0	1.0	0.9	1.1	GΩ	Pass
	10.0	10.2	9.3	10.7	GΩ	Pass
5000V	99.8	107.0	75.0	124.6	GΩ	Pass
	1.0	1.0	0.7	1.3	MΩ	Pass
	9.9	10.0	9.2	10.6	MΩ	Pass
	50.2	50.4	47.5	52.9	MΩ	Pass
	100.2	100.5	95.0	105.4	MΩ	Pass
	1.0	1.0	0.9	1.1	GΩ	Pass
	10.0	10.5	9.4	10.6	GΩ	Pass
	99.8	112.0	86.9	112.7	GΩ	Pass
	1.0	0.9	0.7	1.3	MΩ	Pass
	9.9	10.0	9.2	10.6	MΩ	Pass
	50.2	50.6	47.5	52.9	MΩ	Pass
	100.2	100.9	95.0	105.4	MΩ	Pass
	1.0	1.0	0.9	1.1	GΩ	Pass
	10.0	10.1	9.5	10.5	GΩ	Pass
	99.8	101.0	90.9	108.7	GΩ	Pass

***** End of Certificate *****

Technician


Justin Smith - Technician



CALIBRATION CERTIFICATE

This certificate warrants that the product referenced herein meets or exceeds all published specifications as determined by definitive test procedures which form a part of its historical record, and is Certified Traceable to the National Institute of Standards and Technology (N.I.S.T.).

Model Number: M4100 Instrument

Procedure Used: 72A-0900 or 72A-1792-01

Serial Number: 019700911

Certification Date: October 19, 2015

All equipment used in the test and calibration processes and secondary reference standards are calibrated to the highest order of accuracy and are traceable to the National Institute of Standards and Technology, or other international standards coordinated with N.I.S.T.

CERTIFICATION AS 4:1 CALIBRATION ACCURACY MAINTAINED.

Calibration Approval Person

Test Technician

Signature:

Title:

Signature:

Lenny Strike

Calibration Laboratory Location

Doble Engineering Company
85 Walnut Street
Watertown, MA 02472 USA
Telephone: (617) 926-4900 Fax (617) 926-0528



Responsibility For Quality Assurance Program

Doble Engineering Company
85 Walnut Street
Watertown, MA 02472 USA
Telephone: (617) 926-4900 Fax (617) 926-0528

Model Number: M4100 Instrument

Serial Number: 019700911

Doble Quality Revision: E Date: 7/15/2014

Recommended Calibration Due Date: 10/19/2020

Customer Name: Lee Saretsky

Customer PO#:

Shermco Canada
1033 Kearns Cres.
P.O. Box 995
Regina, Saskatchewan S4P 3E1 CANADA

Doble Engineering Company

Model: M4100		Tested By: L. Strike						
Serial #: 019700911		Date: 10/19/15						
Procedure Used: 72A-0900-01								
Calibration Standards								
Bench #: 513		STD Calibration Due Date: 02/18/16						
Specification:								
Cap. Tolerance		'+/- 0.25%						
%PF Tolerance		'+/- 0.02% up to 39000 pfd						
		'+/- 0.04% above						
KV	Standard Values		Measured Values		% Dev. from STD.		Cap.	%pf
	Cap pfd	%pf	Cap pfd	%pf	Cap pfd	%pf	Pass/Fail	Pass/Fail
2.5	163.08	0.2325	163.04	0.233	-0.02	0.001	Pass	Pass
10.0	163.09	0.1975	163.04	0.203	-0.03	0.006	Pass	Pass
2.5	261.58	0.232	261.55	0.232	-0.01	0.000	Pass	Pass
10.0	261.61	0.1824	261.51	0.193	-0.04	0.011	Pass	Pass
2.5	1088.78	0.1433	1088.37	0.156	-0.04	0.013	Pass	Pass
10.0	1088.71	0.0944	1088.91	0.093	0.02	-0.001	Pass	Pass
2.5	2625.12	0.1715	2625.82	0.171	0.03	-0.001	Pass	Pass
10.0	2624.93	0.0991	2624.93	0.100	0.00	0.001	Pass	Pass
2.5	5670.58	0.1778	5671.46	0.179	0.02	0.001	Pass	Pass
10.0	5670.17	0.1016	5669.96	0.102	0.00	0.000	Pass	Pass
2.5	15885.62	0.1219	15884.54	0.123	-0.01	0.001	Pass	Pass
10.0	15884.72	0.0977	15888.31	0.104	0.02	0.006	Pass	Pass
2.5	37515.02	0.1379	37523.61	0.142	0.02	0.004	Pass	Pass
10.0	37513.07	0.1054	37523.16	0.114	0.03	0.009	Pass	Pass
2.5	216085.05	0.1355	216120.00	0.140	0.02	0.005	Pass	Pass
10.0	216085.05	0.1066	215930.00	0.105	-0.07	-0.002	Pass	Pass
2.5	483920.44	0.1671	483550.00	0.161	-0.08	-0.006	Pass	Pass
10.0	483728.96	0.0941	483400.00	0.097	-0.07	0.003	Pass	Pass
2.5	964239.71	0.1797	963500.00	0.170	-0.08	-0.010	Pass	Pass
10.0	963988.23	0.1088	963600.00	0.107	-0.04	-0.002	Pass	Pass





Certificate of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca



For Instrument : Vanguard EZCT-2000

Customer: Shermco - Regina

Description : Current Transformer Tester

1033 Kearns Cres.

Serial Number : 93467

Regina, SK

Asset Number : RF 6

S4P 3B2

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the calibration organization issuing this report.

Quality Management system registered to ISO 9001: 2015

CALIBRATION INFORMATION

Cal Date: 8 Jun 2020

Temperature 19.3°C

Condition as Received/Returned: IN TOLERANCE

Next Cal Due: 8 Jun 2021

Humidity 38 %

(Pass)

Remarks:

Cal Procedure EZCT-2000

Revision 1.0

STANDARDS USED FOR CALIBRATION

<u>Asset Number</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
IW5210	Fluke 80K-40 HV Probe	05 Dec 2019	05 Dec 2020
IW5447	Fluke 89IV Multimeter	11 Oct 2019	11 Oct 2020
SR2	YEW 2792 1 ohm Resistor	19 Feb 2020	19 Feb 2021
TCRS 753075	H.W.SULLIVAN 46211 Current Transformer	08 Jun 2020	08 Jun 2021



Signed: _____

Justin Smith - Technician

Report of Calibration

The CAT Rental Store
Wirtanen Division
10235 - 180 Street Edmonton, AB T5L 3B2
PHONE: (780) 434-8421
www.catrents.ca

UNIT UNDER TEST:	Vanguard EZCT-2000 Current Transformer Tester	TEST RESULT:	PASS
SERIAL NUMBER:	93467	PERFORMED ON:	08 June 2020
ASSET NUMBER:	RF 6	DATA TYPE:	FOUND-LEFT
PROCEDURE NAME:	EZCT-2000	TEMPERATURE:	19.34 °C
PROCEDURE REV.:	1.0	HUMIDITY:	38 %
CALIBRATED BY:	Justin Smith		
P.O. NUMBER:			
CUSTOMER:	Shermco - Regina 1033 Kearns Cres. Regina, SK S4P 3B2		

The CAT Rental Store certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure unless otherwise noted. It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques.

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Note: Any Test Uncertainty Ratio (TUR) that is less than four to one will appear under the "TUR" heading on the data record. If the TUR meets or exceeds four to one, the field is left blank.

REMARKS:

Standards Used

<u>Asset #</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
IW5210	Fluke 80K-40 HV Probe	12/5/2019	12/5/2020
IW5447	Fluke 89IV Multimeter	10/11/2019	10/11/2020
SR2	YEW 2792 1 ohm Resistor	2/19/2020	2/19/2021
TCRS 753075	H.W.SULLIVAN 46211 Current Transformer	6/8/2020	6/8/2021

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
Test Channel						
X1-X2		Checked				
X1-X3		Checked				
X1-X4		Checked				
X1-X5		Checked				
X2-X3		Checked				
X2-X4		Checked				
X2-X5		Checked				
X3-X4		Checked				
X3-X5		Checked				
X4-X5		Checked				
Voltage						

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>TUR</u>
	49.7	49.8	48.2	51.2	VAC	Pass
	300.5	300.6	296.5	304.5	VAC	Pass
	499.4	499.5	493.4	505.4	VAC	Pass
	1004.2	1004.8	993.2	1015.2	VAC	Pass
		Checked				
Current						
	10.000	10.026	9.880	10.120	A	Pass
	5.748	5.734	5.678	5.818	A	Pass
	2.597	2.558	2.557	2.637	A	Pass
	1.280	1.293	1.248	1.312	A	Pass
Ratio						
	10.000	10.006	9.990	10.010	Ratio	Pass
	20.000	20.016	19.980	20.020	Ratio	Pass
	50.000	49.978	49.950	50.050	Ratio	Pass
	100.000	100.100	99.900	100.100	Ratio	Pass
Resistance						
	1.000	1.020	0.970	1.030	Ω	Pass
	10.000	10.130	9.790	10.210	Ω	Pass

***** End of Certificate *****

Technician



Justin Smith - Technician