

**ArcelorMittal Long
Products
Service & Repairs
July 8th, 2024**



ArcelorMittal

PREPARED FOR: Guillermo
Jorquera Jorquera

JOB NUMBER: 1131824

PREPARED BY:
Dave Metherell

DATE: July 8th, 2024



July 18, 2024

Attention: Guillermo Jorquera

Re: Service and Repairs Report - Our Job# 1131824

Site: ArcelorMittal Long Products – 700 Woodward Ave, Hamilton, ON L8H 6P4

Dear Guillermo,

Please find the attached report for the service work completed on July 8th, 2024.

A summary of the site findings, repairs and recommendations is listed below for your review. All findings are referenced to the Ontario Electrical Safety Code (OESC).

Findings:

- We performed testing on transformer (St2), prior to draining oil and replacing gaskets as noted in the following test package included with this report.
- As well as an after test on the same transformer (St2) once gaskets were replaced and oil was refilled.
- A Vac-truck was on site to help clean up the oil contaminates.
- Removed contaminated stone and replaced with $\frac{3}{4}$ clear washed stone.
- We washed the Tx and pad.
- (St1) Transformer was drained and isolated, filled with nitrogen and is currently offline.
- Replaced Silica Gel
- Investigated ground fault on Battery charger, still a remaining issue.

Pictures on next page of all work completed and investigated.

If you have any questions/concerns, please do not hesitate to contact us. We look forward to being of continued service to ArcelorMittal Long Products.

Dave Metherell

Technical Service Representative



3820 Commerce Road, London ON, N6N 1P8 Canada

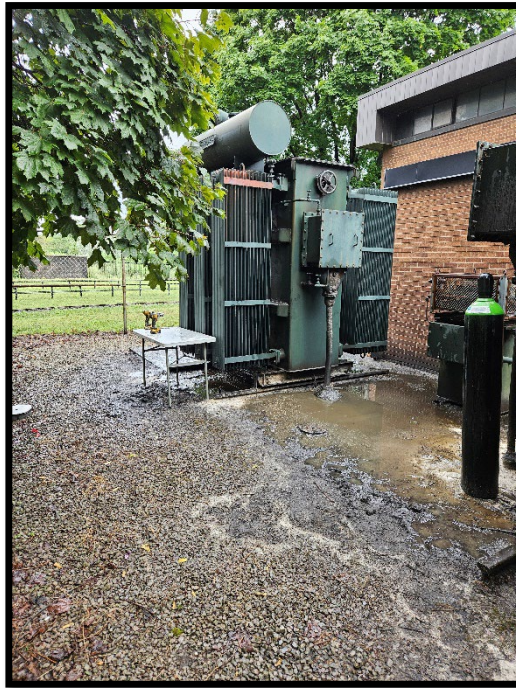
O (519) 842-6458, **M** (226) 559-0330

E Dave.metherell@sparkpowercorp.com

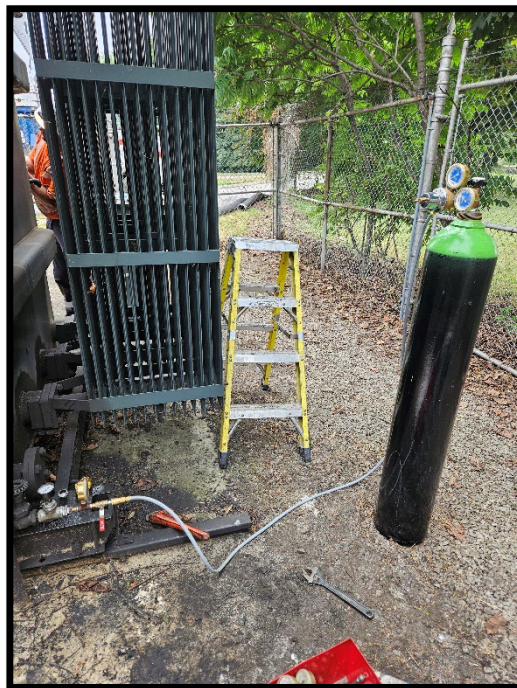
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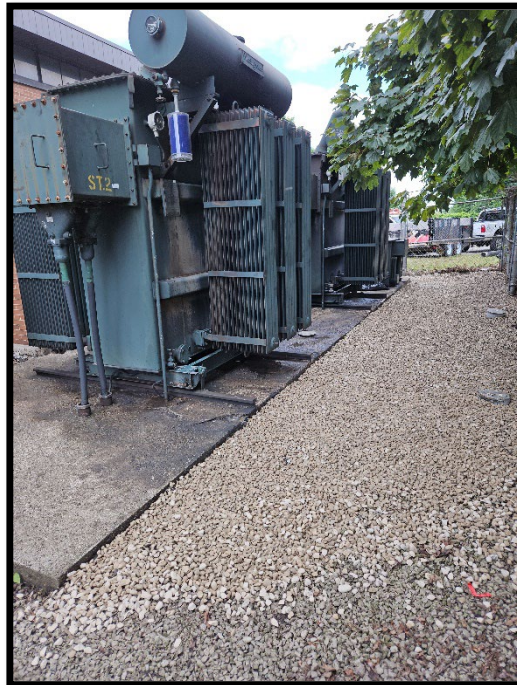
Before Repairs:



Before Repairs:



After Repairs:



After Repairs:



System ID Device ID

Customer **ArcelorMittal Long Products**
 Customer Address **700 Woodward Ave, Hamilton, ON L8H 6P4**
 Site _____
 Site Address **700 Woodward Ave, Hamilton, ON L8H 6P4**

Date **July, 8th 2024**
 Job # **1131824**

Nameplate Data

Transformer Class	Unit Padmount <input type="checkbox"/>	Padmount <input checked="" type="checkbox"/>	Station <input type="checkbox"/>	Other _____
Transformer Cooling	ONAN <input checked="" type="checkbox"/>	ONAF <input type="checkbox"/>	LNAN <input type="checkbox"/>	Other _____
Bushing Configuration	Dead Front <input type="checkbox"/>	Top - Top <input type="checkbox"/>	Top - Side <input type="checkbox"/>	Side - Side <input checked="" type="checkbox"/>
				Other _____

Manufacturer **WESTINGHOUSE**
 Date of Manufacture **1949**
 Serial # **197545**
 KVA / Prov. KVA Rating **3000** **KVA**
 Primary Voltage **13200** **V**
 Primary Ampacity **131** **A**
 Secondary Voltage **2200** **V**
 Secondary Ampacity **787** **A**
 HV Winding Material **CU**
 LV Winding Material **CU**
 CSA Specification(s) **D-723**
 Comments _____

Core & Windings	10000	kg	<input type="checkbox"/>	lb	<input checked="" type="checkbox"/>
Tanks & Fittings	7100	kg	<input type="checkbox"/>	lb	<input checked="" type="checkbox"/>
Coolant Volume	875	L	<input type="checkbox"/>	Gal	<input checked="" type="checkbox"/>
Coolant Weight	7500	kg	<input type="checkbox"/>	lb	<input checked="" type="checkbox"/>
Total Weight	24600	kg	<input type="checkbox"/>	lb	<input checked="" type="checkbox"/>
Temperature Rise	55	°C	<input checked="" type="checkbox"/>	°F	<input type="checkbox"/>
HV BIL Rating	_____	kV			
LV BIL Rating	_____	kV			
Percent Impedance	8.90 %	ONAN	<input type="checkbox"/>	ONAF	<input type="checkbox"/>
Tamper Resistant	_____	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>
Transformer Colour	GREEN				

Visual Inspection

Nameplate Condition	Satisfactory <input checked="" type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input type="checkbox"/>	Comments _____
Fan / Pump Operation	Satisfactory <input type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	Comments _____
Ground Connections	Satisfactory <input checked="" type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input type="checkbox"/>	Comments _____
Liquid Levels In Tanks	Satisfactory <input type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input type="checkbox"/>	Comments _____
Interlock Operation	Satisfactory <input type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>	Comments _____
Temp. Gauge Operation	Satisfactory <input type="checkbox"/>	Not Satisfactory <input type="checkbox"/>	N/A <input type="checkbox"/>	Comments _____

Coolant Temperature **35** °C °F Max. Coolant Temperature **48** °C °F

Comments _____

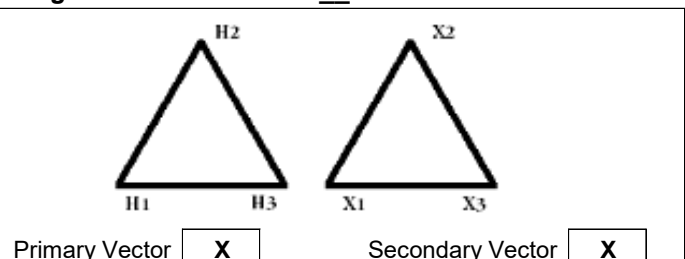
Oil Conservator

Oil Conservator	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Conservator Volume 100?	L <input checked="" type="checkbox"/>	Gal <input type="checkbox"/>
Silica Gel Breather	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Breather Volume _____	L <input type="checkbox"/>	Gal <input type="checkbox"/>
Silica Gel Colour	Good <input type="checkbox"/>	Bad <input type="checkbox"/>	Replaced <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>	
Comments	_____				

Tap Changer Data

Position / Designation	Tap Voltages (V)	As Found	As Left
1 / A	105.00%	13200	X
2 / B	102.50%	12870	
3 / C	100.00%	12540	
4 / D	97.50%	12210	
5 / E	95.00%	11880	

Vector Diagram: DeltaDelta_3.Dd0



Comments: **BEFORE TEST - BEFORE RE GASKETING AND OIL DRAIN**

Recorded By: **C. GREENHEAD**



TRANSFORMER DATA SHEET (Pg. 2 of 4)

System ID [] Device ID [ST 2]

Neutral Grounding Resistor (NGR)

NGR Present Yes [X] No []
Manufacturer [] NGR Serial # []
NGR Voltage [] V Maximum Current [] A
NGR Resistance [] Ω NGR Location []
Comments NAMEPLATE NOT LEGIBLE

Transformer Lightning Arrestors

Lightning Arrestors Yes [] No [X]
Class Distribution [] Intermediate [] Station []
Composition Ceramic [] Polymer []
Manufacturer [] Max. / MCOV Rating [] / [] kV
Catalog # []
Comments []

Interlock

Key Interlock Yes [] No [X]
Interlock Type Elec. [] Mech. [] Utility Lock []
Devices Interlocked H.V. Switch [] Breaker [] Trans. Encl. [] Other []
Manufacturer [] Key Interlock # []
Comments []

Fans

Fans Yes [] No [X]
of Fans [] Fan Voltage []
Fan Size [] Frame Size []
Horsepower []
Comments []

Transformer Load Side Conductor Data

Conductor Type Cable [X] Bus Bar [] Conductor Size / Dim. []
Conductor Material Aluminum [] Copper [X] Conductors per Phase [] / Phase
Tape Shield Aluminum [] Copper [] Bond Size / Dim. []
Concentric Neutral Aluminum [] Copper [] # of Bond Conductors []
Insulation Voltage [] # of Neutral Conductors []
Insulation Type [] Neutral Size / Dim. []

Comments: CABLE IS OIL FILLED , BUSHINGS OIL FILLED

Recorded By: C. GREENHEAD

System ID Device ID

Electrical Tests

Turn Ratio Test Test Voltage: Automatic Other V

Tap Position / Designation	Tap Voltage V	Calculated Ratio	H	To	H	H	To	H	H	To	H
			X	To	X	X	To	X	X	To	X
1 / A	105.00%	13200	6.005			6.005			6.005		
2 / B	102.50%	12870									
3 / C	100.00%	12540									
4 / D	97.50%	12210									
5 / E	95.00%	11880									

	Excitation Current	Percent Deviation	Excitation Current	Percent Deviation	Excitation Current	Percent Deviation
Tap Position As Found	X 8.700 mA	0.090 %	6.500 mA	0.090 %	8.400 mA	0.090 %
Tap Position As Left						

Primary Winding Resistance

Resistance in ohms at 1 A after 1 minute

H0 - H1	N/A Ω	H1 - H2	0.343 Ω
H0 - H2	N/A Ω	H2 - H3	0.342 Ω
H0 - H3	N/A Ω	H3 - H1	0.343 Ω

Stabilization Time > 1 Minute

Secondary Winding Resistance

Resistance in milli-ohms at 10 A after 1 minute

X0 - X1	N/A mΩ	X1 - X2	12.739 mΩ
X0 - X2	N/A mΩ	X2 - X3	12.794 mΩ
X0 - X3	N/A mΩ	X3 - X1	12.562 mΩ

Stabilization Time > 1 Minute

Capacitance Test

Capacitance in pico-farads	Low - Ground	Low - Guard	UST (High - Low)	High - Guard	High - Ground
	2457 pF	780 pF	1676 pF	66020 pF	67350 pF
Uncorrected D.F. (%)	1.230 %	1.420 %	1.100 %	0.430 %	0.452 %
Corrected to 20 °C (%)	0.627 %	0.724 %	0.561 %	0.219 %	0.231 %
Temp. Correction Factor	0.51				

Lightning Arrestor Insulation Resistance

Resistance in meg-ohms @ <u>N/A</u> V DC after 1 minute	Phase A to Ground	N/A MΩ
	Phase B to Ground	N/A MΩ
	Phase C to Ground	N/A MΩ

Secondary Conductor Insulation Resistance

Resistance in meg-ohms @ <u>2500</u> V DC after 1 minute	TESTED WITH TX!		
Phase A to Ground	MΩ	Phase A to Phase B	MΩ
Phase B to Ground	MΩ	Phase B to Phase C	MΩ
Phase C to Ground	MΩ	Phase C to Phase A	MΩ

Comments / Observations

CAP BRIDGE DONE WITH SECONDARY CABLES ATTACHED

Test Instrument(s)	Manufacturer / Model	Ratio	Winding	Cap Bridge	Megger
	Serial #	374-226	363-104	0412	2589

Tested By: C. GREENHEAD

System ID

 Device ID

ST 2

Dielectric Absorption Test (Insulation Resistance)

Time	High to Low & Gnd		Low to High & Gnd		High & Low to Gnd	
	Uncorrected	Corrected	Uncorrected	Corrected	Uncorrected	Corrected
15 sec	3800 MΩ	9500 MΩ	134 MΩ	335 MΩ	131 MΩ	327 MΩ
30 sec	4950 MΩ	12375 MΩ	135 MΩ	339 MΩ	134 MΩ	335 MΩ
45 sec	5450 MΩ	13625 MΩ	138 MΩ	344 MΩ	134 MΩ	336 MΩ
1 min	5720 MΩ	14300 MΩ	138 MΩ	345 MΩ	135 MΩ	338 MΩ
2 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
3 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
4 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
5 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
6 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
7 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
8 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
9 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
10 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
Test Voltage	10000 V		2500 V		2500 V	
Multiplier	1		1		1	
Polarization Index	1.00		1.00		1.00	
TCC	2.50		Insulation Resistance Readings Corrected to 20 °C			

Insulation Resistance

Resistance in meg-ohms after 1 minute.

High to Low & Ground	14300 MΩ @	10000 V
Low to High & Ground	345 MΩ @	2500 V
High & Low to Ground	338 MΩ @	2500 V

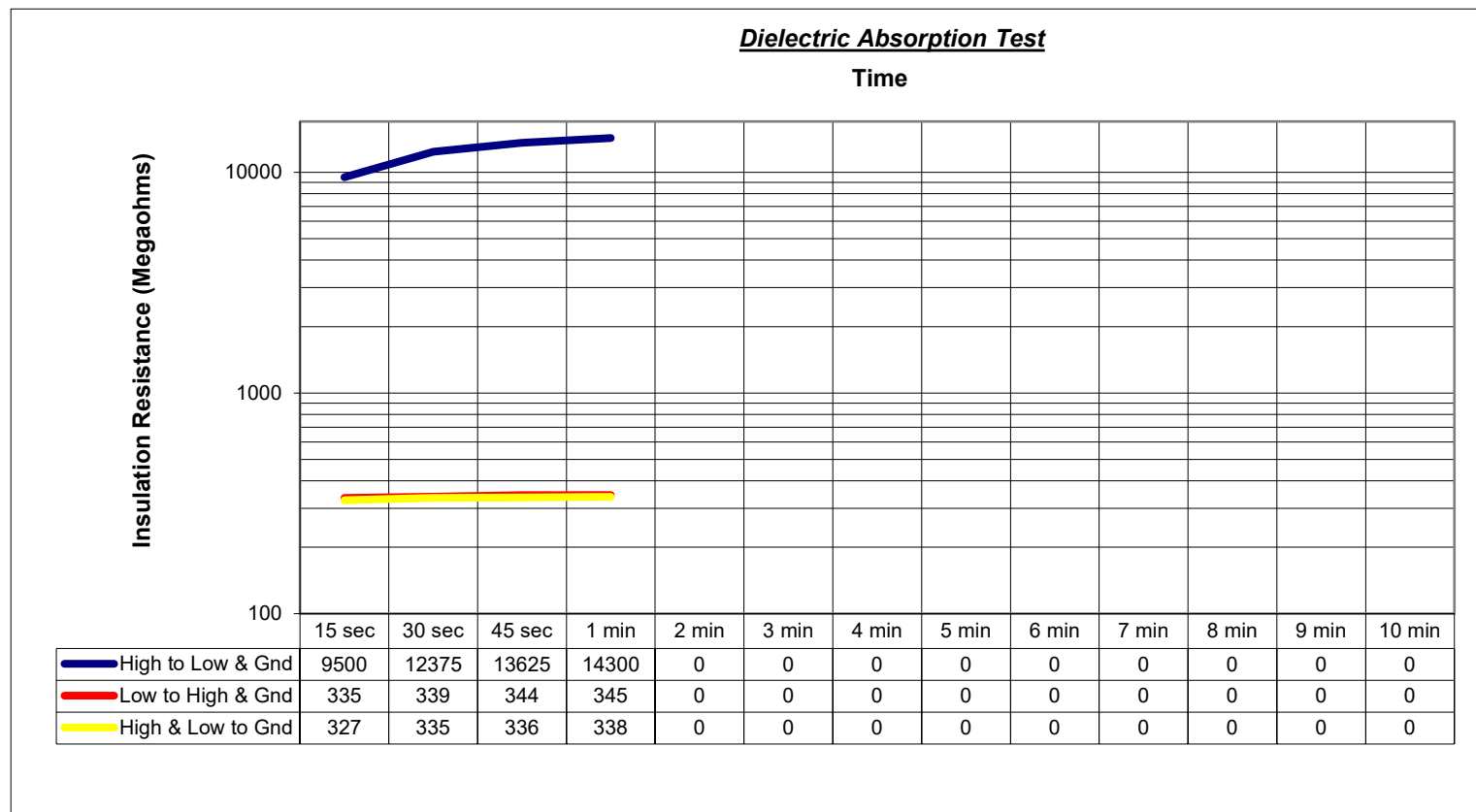
Core Ground Insulation Resistance

Resistance in meg-ohms after 1 minute.

Core Ground Accessible Yes No

Test Voltage _____ V

Core Ground Resistance _____ MΩ



Test Instrument(s)

Manufacturer / Model

Megger

Serial #

2589

 Comments: **BEFORE TEST**

 Tested By: **C. GREENHEAD**

System ID Device ID

Customer ArcelorMittal Long Products
 Customer Address 700 Woodward Ave, Hamilton, ON L8H 6P4
 Site _____
 Site Address 700 Woodward Ave, Hamilton, ON L8H 6P4

Date July, 8th 2024
 Job # 1131824

Nameplate Data

Transformer Class Unit Padmount Padmount Station Other _____
 Transformer Cooling ONAN ONAF LNAN DRY Other _____
 Bushing Configuration Dead Front Top - Top Top - Side Side - Side Other _____

Manufacturer WESTINGHOUSE
 Date of Manufacture 1949
 Serial # 197545
 KVA / Prov. KVA Rating 3000 **KVA**
 Primary Voltage 13200 **V**
 Primary Ampacity 131 **A**
 Secondary Voltage 2200 **V**
 Secondary Ampacity 787 **A**
 HV Winding Material CU
 LV Winding Material CU
 CSA Specification(s) D-723
 Comments _____

Core & Windings 10000 kg lb
 Tanks & Fittings 7100 kg lb
 Coolant Volume 875 L Gal
 Coolant Weight 7500 kg lb
 Total Weight 24600 kg lb
 Temperature Rise 55 °C °F
 HV BIL Rating _____ kV
 LV BIL Rating _____ kV
 Percent Impedance 8.90 % ONAN ONAF
 Tamper Resistant YES NO
 Transformer Colour GREEN

Visual Inspection

Nameplate Condition Satisfactory Not Satisfactory N/A Comments _____
 Fan / Pump Operation Satisfactory Not Satisfactory N/A Comments _____
 Ground Connections Satisfactory Not Satisfactory N/A Comments _____
 Liquid Levels In Tanks Satisfactory Not Satisfactory N/A Comments _____
 Interlock Operation Satisfactory Not Satisfactory N/A Comments _____
 Temp. Gauge Operation Satisfactory Not Satisfactory N/A Comments _____

Coolant Temperature 35 °C °F Max. Coolant Temperature 48 °C °F
 Comments _____

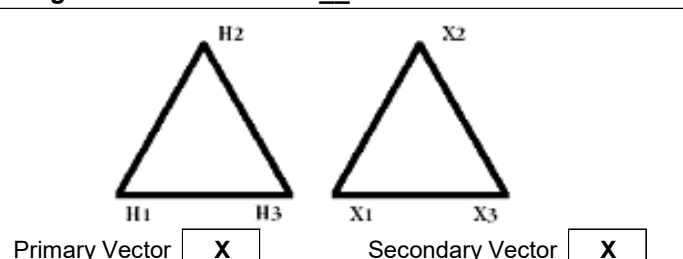
Oil Conservator

Oil Conservator Yes No Conservator Volume 100? L Gal
 Silica Gel Breather Yes No Breather Volume _____ L Gal
 Silica Gel Colour Good Bad Replaced N/A
 Comments _____

Tap Changer Data

Position / Designation	Tap Voltages (V)	As Found	As Left
1 / A	105.00%	13200	X
2 / B	102.50%	12870	
3 / C	100.00%	12540	
4 / D	97.50%	12210	
5 / E	95.00%	11880	

Vector Diagram: DeltaDelta_3.Dd0



Comments: 2ND TEST- AFTER GASKETING AND REFILL OF OIL

Recorded By: C. GREENHEAD



TRANSFORMER DATA SHEET (Pg. 2 of 4)

System ID [] Device ID [ST 2]

Neutral Grounding Resistor (NGR)

NGR Present Yes [X] No []
Manufacturer [] NGR Serial # []
NGR Voltage [] V Maximum Current [] A
NGR Resistance [] Ω NGR Location []
Comments NAMEPLATE NOT LEGIBLE

Transformer Lightning Arrestors

Lightning Arrestors Yes [] No [X]
Class Distribution [] Intermediate [] Station []
Composition Ceramic [] Polymer []
Manufacturer [] Max. / MCOV Rating [] / [] kV
Catalog # []
Comments []

Interlock

Key Interlock Yes [] No [X]
Interlock Type Elec. [] Mech. [] Utility Lock []
Devices Interlocked H.V. Switch [] Breaker [] Trans. Encl. [] Other []
Manufacturer [] Key Interlock # []
Comments []

Fans

Fans Yes [] No [X]
of Fans [] Fan Voltage []
Fan Size [] Frame Size []
Horsepower []
Comments []

Transformer Load Side Conductor Data

Conductor Type Cable [X] Bus Bar [] Conductor Size / Dim. []
Conductor Material Aluminum [] Copper [X] Conductors per Phase [] / Phase
Tape Shield Aluminum [] Copper [] Bond Size / Dim. []
Concentric Neutral Aluminum [] Copper [] # of Bond Conductors []
Insulation Voltage [] # of Neutral Conductors []
Insulation Type [] Neutral Size / Dim. []

Comments: CABLE IS OIL FILLED , BUSHINGS OIL FILLED

Recorded By: C. GREENHEAD

System ID Device ID

Electrical Tests

Turn Ratio Test Test Voltage: Automatic Other V

Tap Position / Designation	Tap Voltage V	Calculated Ratio	H To H	H To H	H To H
			X To X	X To X	X To X
1 / A	105.00%	13200	6.008	6.008	6.009
2 / B	102.50%	12870			
3 / C	100.00%	12540			
4 / D	97.50%	12210			
5 / E	95.00%	11880			

	Excitation Current	Percent Deviation	Excitation Current	Percent Deviation	Excitation Current	Percent Deviation
Tap Position As Found	mA	%	mA	%	mA	%
Tap Position As Left	X 10.100 mA	0.120 %	8.300 mA	0.130 %	12.400 mA	0.140 %

Primary Winding Resistance

Secondary Winding Resistance

Resistance in ohms at <u>1</u> A after 1 minute				Resistance in milli-ohms at <u>10</u> A after 1 minute			
H0 - H1	N/A Ω	H1 - H2	0.338 Ω	X0 - X1	N/A mΩ	X1 - X2	12.395 mΩ
H0 - H2	N/A Ω	H2 - H3	0.337 Ω	X0 - X2	N/A mΩ	X2 - X3	12.397 mΩ
H0 - H3	N/A Ω	H3 - H1	0.337 Ω	X0 - X3	N/A mΩ	X3 - X1	12.549 mΩ

Stabilization Time > 1 Minute

Stabilization Time > 1 Minute

Capacitance Test

Capacitance in pico-farads	Low - Ground	Low - Guard	UST (High - Low)	High - Guard	High - Ground
	4179 pF	1374 pF	2816 pF	67000 pF	69830 pF
Uncorrected D.F. (%)	1.340 %	1.150 %	0.930 %	1.690 %	0.740 %
Corrected to 20 °C (%)	0.683 %	0.587 %	0.474 %	0.862 %	0.377 %
Temp. Correction Factor	0.51				

Lightning Arrestor Insulation Resistance

Resistance in meg-ohms @ <u>N/A</u> V DC after 1 minute	Phase A to Ground	Phase B to Ground	Phase C to Ground
	N/A MΩ	N/A MΩ	N/A MΩ

Secondary Conductor Insulation Resistance

Resistance in meg-ohms @ <u>2500</u> V DC after 1 minute	TESTED WITH TX!		
Phase A to Ground	MΩ	Phase A to Phase B	MΩ
Phase B to Ground	MΩ	Phase B to Phase C	MΩ
Phase C to Ground	MΩ	Phase C to Phase A	MΩ

Comments / Observations

CAP BRIDGE DONE WITH SECONDARY CABLES ATTACHED

Test Instrument(s)	Manufacturer / Model	Ratio	Winding	Cap Bridge	Megger
	Serial #	374-226	363-104	0412	2589

Tested By: C. GREENHEAD

System ID Device ID

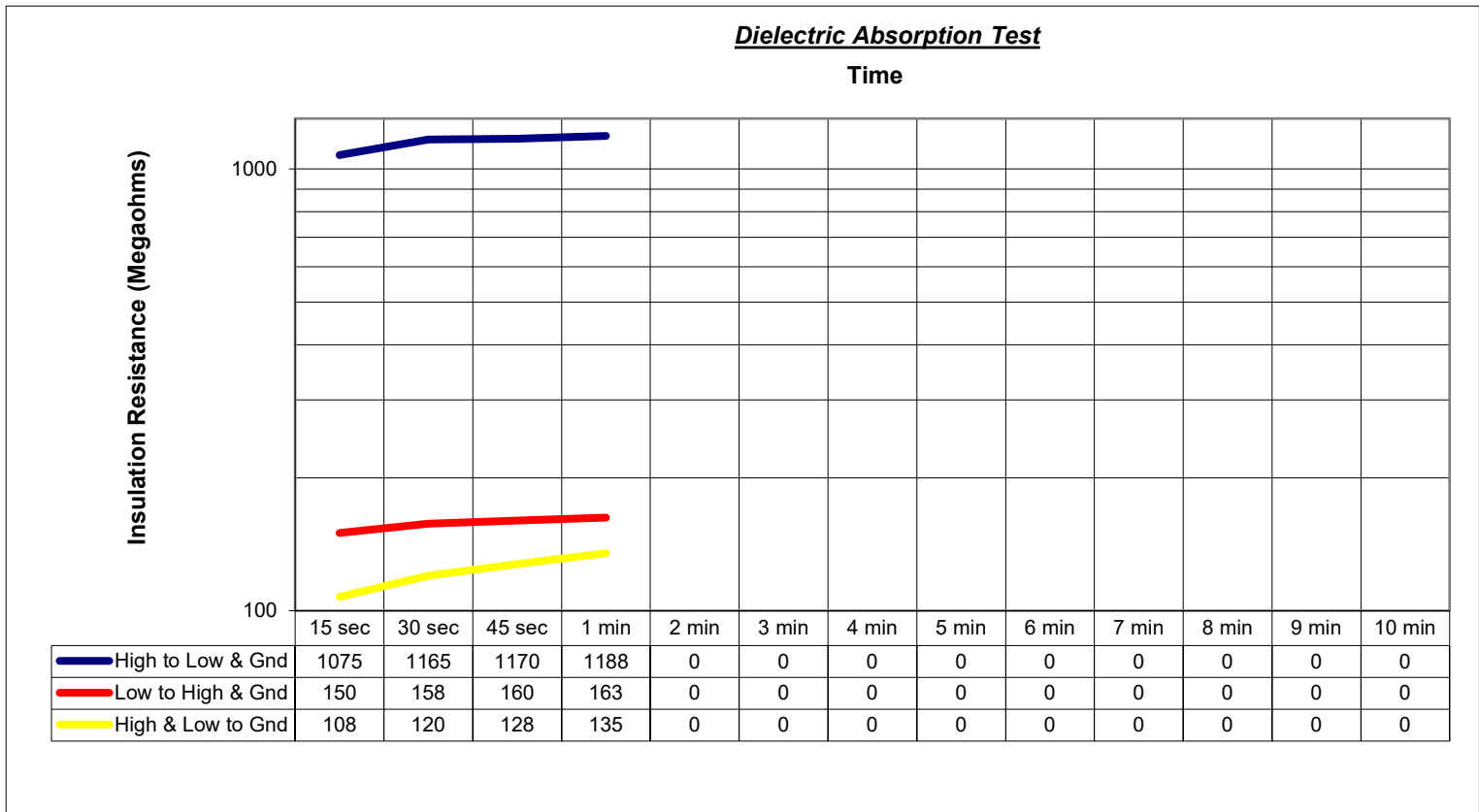
Dielectric Absorption Test (Insulation Resistance)

Time	High to Low & Gnd		Low to High & Gnd		High & Low to Gnd	
	Uncorrected	Corrected	Uncorrected	Corrected	Uncorrected	Corrected
15 sec	430 MΩ	1075 MΩ	60 MΩ	150 MΩ	43 MΩ	108 MΩ
30 sec	466 MΩ	1165 MΩ	63 MΩ	158 MΩ	48 MΩ	120 MΩ
45 sec	468 MΩ	1170 MΩ	64 MΩ	160 MΩ	51 MΩ	128 MΩ
1 min	475 MΩ	1188 MΩ	65 MΩ	163 MΩ	54 MΩ	135 MΩ
2 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
3 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
4 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
5 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
6 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
7 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
8 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
9 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
10 min	MΩ	MΩ	MΩ	MΩ	MΩ	MΩ
Test Voltage	10000 V		2500 V		2500 V	
Multiplier	1		1		1	
Polarization Index	1.00		1.00		1.00	
TCC	2.50		Insulation Resistance Readings Corrected to 20 °C			

Insulation Resistance

Core Ground Insulation Resistance

Resistance in meg-ohms after 1 minute.				Resistance in meg-ohms after 1 minute.			
High to Low & Ground	1188 MΩ @	10000 V		Core Ground Accessible	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Low to High & Ground	163 MΩ @	2500 V		Test Voltage	1 V		
High & Low to Ground	135 MΩ @	2500 V		Core Ground Resistance		MΩ	



Test Instrument(s) Manufacturer / Model
Serial #

Comments: **2ND TEST AFTER RE-GASKETING AND OIL REFILL**

Tested By: **C. GREENHEAD**