

SLIV MAIN TRANSFORMER INSPECTION FORM:

CAR NO: 114

INBOUND/OUTBOUND (CIRCLE ONE) DATE: 8-14-25

NAME PLATE INFORMATION:

Serial Number: 4594841-4

Job Number: _____

Vendor Date: _____

Fluid Type/Color: clear ET-200

HIGH VOLTAGE CONNECTIONS			
FREQUENCY:	VOLTS:	INSULATION LEVEL:	MAX RMS AMP:
25	11,000	95	71.5
60	11,000	95	71.5

LOW VOLTAGE CONNECTIONS:				
VOLTS 25HZ:	VOLTS 60HZ:	WINDING:	LEADS ON:	MAX RMS AMP:
556	556	L.V. A	X1-X2	450
500	500	L.V. B	X3-X4	515
509	509	L.V. C	X5-X6	423
471	471	L.V. D	X7-X8	213
647	647	(AUX)	X7-X9	213

VISUAL INSPECTION OF UNIT:

- UNIT IS CLEAN: YES / NO
- BUSHINGS ARE CLEAN: YES / NO *Dirty*
- COOLER IS CLEAN: YES / NO
- OIL LEVEL IS CORRECT: YES / NO *Full*
- NAMEPLATE IS CORRECT FOR Unit: YES / NO
- VERIFY THERE ARE NO SIGNS OF LEAKS: YES / NO
- FLUID TYPE STENCILED ON UNIT: YES / NO
- ALL REQUIRED COVERS ON UNIT: YES / NO
- TRANSFORMER PUMP HAS SIGHT GLASS: YES / NO
- REMOVE TXF PUMP COVER & CHECK FOR LEAKS: YES / NO
- MEGGER TXF PUMP COVER GASKET {ABOVE 1 MEG}: YES / NO
- TRANSFORMER COOLING FANS SPIN FREE: YES / NO
- THERMAL SWITCH INCLUDED {CAL. TO 203°F}: YES / NO

SLIV MAIN TRANSFORMER INSPECTION FORM:

TRANSFORMER INSULATION RESISTANCE TEST

TRANSFORMER INSULATION RESISTANCE TEST USE 1000VDC MEGGER-10 MEGOHM MINIMUM

- HV TO LV: 1.0 G Ohms
- HV TO GND: 500 M Ohms
- LV TO GND: 1.0 G Ohms

TRANSFORMER TURN RATIO (TTR)

L.V. BUSHING @11000 VOLT H1-H2

Silicone & ET 200/360

FR-15 & ET-200

OEM SILICONE

X1-X2: 19.685 -19.883

X1-X2: 19.685 -19.883

X1-X2: 16.659 -16.827

X3-X4: 21.890 -22.110

X3-X4: 21.890 -22.110

X3-X4: 18.774 -18.962

X5-X6: 21.503 -21.719

X5-X6: 21.503 -21.719

X5-X6: 18.181 -18.363

X7-X8: 23.216 -23.450

X7-X8: 20.729 -20.937

X7-X8: 23.238 -23.472

X7-X9: 16.922 -17.092

X7-X9: 15.159 -15.311

X7-X9: 16.917 -17.087

X1-X2: 19.824

X1-X2: _____

X1-X2: _____

X3-X4: 22.105

X3-X4: _____

X3-X4: _____

X5-X6: 21.685

X5-X6: _____

X5-X6: _____

X7-X8: 23.463

X7-X8: _____

X7-X8: _____

X7-X9: 17.171

X7-X9: _____

X7-X9: _____

SLIV MAIN TRANSFORMER INSPECTION FORM:

TRANSFORMER PUMP TEST:

Perform the Megger test to ground on each terminal set the 1000-volt megger (minimum of 200 Megohms to ground).

- T1: 1.2 g Meg ohms to GND.
- T2: 1.2 g Meg ohms to GND.
- T3: 1.2 g Meg ohms to GND.

Perform the resistance test to each phase of the pump motor.

T1 - T2 = 4.0 Ohms (2.2 ± .4 0) OR _____ Ohms (3.2 ± .4 0)
T2 - T3 = 4.0 Ohms (2.2 ± .4 0) OR _____ Ohms (3.2 ± .4 0)
T3 - T1 = 4.0 Ohms (2.2 ± .4 0) OR _____ Ohms (3.2 ± .4 0)

TRANSFORMER COOLING FAN MOTORS:

Perform the Megger test to ground on each terminal using the 1000-volt megger (minimum of 200 Megohms to ground).

FAN #1:
T1: 700 m Ohms to GND.
T2: 700 m Ohms to GND.
T3: 700 m Ohms to GND.

FAN #2:
T1: 700 m Ohms to GND.
T2: 700 m Ohms to GND.
T3: 700 m Ohms to GND.

SLIV MAIN TRANSFORMER INSPECTION FORM:

Perform the resistance test to each phase of the motor.

FAN # 1:

T1 -T2: 6.0 Ohms (9.5 ± 3 0).

T2 -T3: 6.0 Ohms (9.5 ± 3 0).

T3 -T1: 6.0 Ohms (9.5 ± 3 0).

FAN #2:


T1 -T2: 6.0 Ohms (9.5 ± 3 0).

T2 -T3: 6.0 Ohms (9.5 ± 3 0).

T3 -T1: 6.0 Ohms (9.5 ± 3 0).

COMMENTS/DEFECTS:

Leaking at primary. Boot is melted on primary
Terminal

EMPLOYEE SIGNATURE: 

EMPLOYEE NUMBER: _____

MAINT. MANAGER SIGNATURE: 

ABB	ABB EL Industrial Solutions	Denver Service Center	
		Work Instruction Form	
Owner: Denver Quality Manager		Date: 10/30/2019 Rev B	Page: 1 of 5
Title: SEPTA Final Test- REWIND		Supersedes: NEW	Doc. # 033-XFR-106

Job Number: 4594891

Serial Number: 4594891-4

Final Test Results For SEPTA SLIV Transformer - NEW

Rating: FOA - 25/60Hz - 787 KVA - 75 Deg C - 11000 V

	FREQ.	HV H1 & H2	LV 'A' X1 & X2	LV 'B' X3 & X4	LV 'C' X5 & X6	LV 'D' X7 & X8	AUX X7 & X9
VOLTAGE:	60 Hz	11000	556	500	509	471	647
VOLTAGE:	25 Hz	11000	556	500	509	471	647
MAX AMPS:		71.5	450	515	423	213	213

MEGGER

WINDING UNDER TEST	TEST VOLTAGE	APPLIED TIME	MEGGER READINGS AT TEMPERATURE		ACCEPT-ABLE RANGE	STATUS
			21	DEG C		
HV-to-GND, GUARD LV	1000 VDC	60 SECONDS	6.940	G Ω	>500 MEG	PASS
LV-to-GND, GUARD HV	1000 VDC	60 SECONDS	5.000	G Ω	>500 MEG	PASS
HV-to-LV, GUARD Tank	1000 VDC	60 SECONDS	9.170	G Ω	>500 MEG	PASS
A-B	1000 VDC	60 SECONDS	5.850	G Ω	>500 MEG	PASS
B-C	1000 VDC	60 SECONDS	4.820	G Ω	>500 MEG	PASS
C-A	1000 VDC	60 SECONDS	4.190	G Ω	>500 MEG	PASS
A-B-C TO AUX	1000 VDC	60 SECONDS	5.120	G Ω	>500 MEG	PASS
EQUIP. TYPE: Megger S1-1068 ID#: 51-2060957 CAL EXP. DATE: 3/2021						

RESISTANCE

WINDING	RESISTANCE AT 21.0 DEGREES C		RES. CORRECTED TO 95 DEGREES C		ACCEPT. RANGE AT 95 DEGREES C		STATUS
		Ω		Ω			
H1 - H2	2.5804	Ω	3.328	Ω	3.20	3.50	PASS
X1 - X2	14.418	m Ω	18.594	m Ω	17.13	18.93	PASS
X3 - X4	12.007	m Ω	15.485	m Ω	14.24	15.92	PASS
X5 - X6	14.174	m Ω	18.279	m Ω	16.96	18.77	PASS
X7 - X8	20.602	m Ω	26.569	m Ω	24.47	27.06	PASS
X7 - X9	23.158	m Ω	29.865	m Ω	27.97	30.94	PASS
EQUIP. TYPE: Raytech WR50-12 ID#: '51-2050780 CAL EXP. DATE: 6/2021							

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Job Number: 4594891 Serial Number: 4594891-4

Final Test Results For SEPTA SLIV Transformer - NEW

RATIO

CONNECTION	CALC. RATIO	TESTED RATIO	ACETABLE RANGE			STATUS
			MIN		MAX	
HV-LV 'A': 11000 - 556	19.784	19.727	19.685	-	19.883	PASS
HV-LV 'B': 11000 - 500	22.000	22.002	21.890	-	22.110	PASS
HV-LV 'C': 11000 - 509	21.611	21.592	21.503	-	21.719	PASS
HV-LV 'D': 11000 - 471	23.404	23.357	23.287	-	23.521	PASS
HV-LV 'AUX': 11000 - 647	17.002	17.081	16.917	-	17.087	PASS
HV-LV 'A-B': 11000 - 1056	10.417	10.403	10.365	-	10.469	PASS
HV-LV 'A-B-C': 11000 - 1565	7.029	7.020	6.994	-	7.064	PASS
HV-LV 'A-B-C-AUX': 11000 - 2036	5.403	5.399	5.376	-	5.430	PASS
EQUIP. TYPE: Vanguard Tri-Ø ID#: '51-2060203 CAL EXP. DATE: 4/2021						

POWER FACTOR

DESCRIPTION	MEAS. PF @ °C	CORR. FACTOR	CORR. PF 20.0 °C	VALUE	LEVEL	STATUS
CH - HIGH TO GROUND	%		0.499 %	< 1%	5000V	PASS
CL - LOW TO GROUND	%		0.694 %	< 1%	500V	PASS
CHL - HIGH TO LOW	%		0.351 %	< 1%	5000V	PASS
EQUIP. TYPE: Doble M4100 ID#: '51-2062584 CAL EXP. DATE: 8/2021						

APPLIED VOLTAGE TEST

WDG TESTED	SHORT & GRD	APPLIED TIME	APPLIED VOLTAGE	STATUS
H1 H2	X1X2 - X3X4 - X5X6 - X7X9	60 SEC.	10KV	PASS
X1 X2	H1H2 - X3X4 - X5X6 - X7X9	60 SEC.	10KV	PASS
X3 X4	H1H2 - X1X2 - X5X6 - X7X9	60 SEC.	10KV	PASS
X5 X6	H1H2 - X1X2 - X3X4 - X7X9	60 SEC.	10KV	PASS
X7 X9	H1H2 - X1X2 - X3X4 - X5X6	60 SEC.	10KV	PASS
EQUIP. TYPE: Doble M4100 ID#: '51-2062584 CAL EXP. DATE: 8/2021				

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Job Number: 4594891 Serial Number: 4594891-4

Final Test Results For SEPTA SLIV Transformer - NEW

NO LOAD LOSS WATTS (CORE LOSS) & EXCITING CURRENT

CONN.	HZ	LEVEL	VOLTAGE (V)			CURRENT (A)			POWER (W)		
			METER	K _{PT}	VOLT	METER	K _{CT}	AMPS	METER	K _W	WATTS
X7 - X9	60	722	722.3	1	722.3	0.659	1	0.659	452.6	1	452.6
			M. Watts		Range		M. AMPS		ACC.	STATUS	
X7 - X9	60	722			450W - 550W			<1A	PASS		
EQUIP. TYPE: NORMA 5000			ID#: 51-2059738			CAL EXP. DATE: 1/2020					

K_{PT} = PT RATIO K_{CT} = CT RATIO K_W = CT RATIO X PT RATIO

INDUCED TEST

WINDING	CONNECTIONS	DURATION 7200 CYCLES	CURRENT	VOLTS	LEVEL RATED *1.5	STATUS
X7-X9	LV OPEN, H2-GRD.	24 SEC.	1.493	971.9	971V	PASS
EQUIP. TYPE: NORMA 5000			ID#: 51-2059738			CAL EXP. DATE: 1/2020

Impedance & Load Loss Test

CONN.	HZ	LEVEL (HV)	VOLTAGE (V)			CURRENT (A)			POWER (W)		
			METER	K _{PT}	VOLT	METER	K _{CT}	AMPS	METER	K _W	WATTS
11000 - 556	60	22.7 A	832.8	1	832.8	22.688	1	22.688	4.4254	1	4.4254
11000 - 500	60	23.4 A	515.9	1	515.9	23.435	1	23.435	4.7582	1	4.7582
11000 - 509	60	19.6A	586.7	1	586.7	19.586	1	19.586	3.6809	1	3.6809
11000 - 647	60	12.5A	550.2	1	550.2	12.512	1	12.512	1.5342	1	1.5342
11000 - 1565	60	57.6A	1477.1	1	1477.1	57.56	1	57.56	15.987	1	15.987
EQUIP. TYPE: NORMA 5000			ID#: 51-2059738			CAL EXP. DATE: 1/2020					

K_{PT} = PT RATIO K_{CT} = CT RATIO K_W = CT RATIO X PT RATIO

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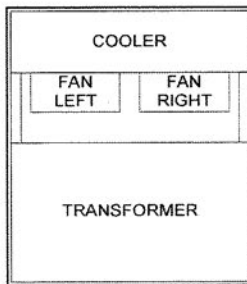
Final Test Results For SEPTA SLIV Transformer - NEW

PUMP RESISTANCE & ROTATION (Hot Readings after 2 HOURS)

DESCRIPTION	COLD RESISTANCE	ROTATION CORRECT	HOT RESISTANCE	COLD RES. +15%	STATUS
PUMP	3.5 Ω	Correct	3.8 Ω	4.0	PASS
FAN, LEFT	5.8 Ω	Correct	6.1 Ω	6.7	PASS
FAN, RIGHT	5.8 Ω	Correct	6.0 Ω	6.7	PASS
EQUIP. TYPE: Fluke 117 ID#: '51-2061256 CAL EXP. DATE: 10/2020					
NOTE: MAXIMUM PUMP AND FAN HOT RESISTANCE - 115% OF COLD RESISTANCE					

PUMP VOLTAGE, CURRENT & POWER (2 HOURS)

DESCRIPTION	VOLTAGE (V)		CURRENT (A)		POWER (W)		STATUS
	START	END	START	END	START	END	
PUMP A PH	134.8	136.0	6.25	6.19	671	658	PASS
PUMP B PH	132.7	133.6	6.00	5.92	609	596	PASS
PUMP C PH	131.0	132.7	5.84	5.85	618	618	PASS
FAN, LEFT A PH	132.8	133.6	1.76	1.74	89	87	PASS
FAN, LEFT B PH	135.0	136.0	1.85	1.87	104	100	PASS
FAN, LEFT C PH	131.2	133.1	1.76	1.79	103	104	PASS
FAN, RIGHT A PH	132.8	133.6	1.84	1.76	96	86	PASS
FAN, RIGHT B PH	134.9	136.0	1.91	1.88	113	101	PASS
FAN, RIGHT C PH	130.9	132.7	1.80	1.88	107	106	PASS
EQUIP. TYPE: Fluke 117 ID#: '51-2061256 CAL EXP. DATE: 10/2020							
EQUIP. TYPE: ID#: CAL EXP. DATE:							
EQUIP. TYPE: ID#: CAL EXP. DATE:							



(TOP VIEW)

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ABB	ABB EL Industrial Solutions	Denver Service Center	
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Final Test Results For SEPTA SLIV Transformer - NEW

COMMENTS:

Applied Test:

HV-to-Gnd (All Other Windings Grounded): 10.000 kV, 19.379 mA, 0.655 W, 4.799 Nf, 60 Seconds
PASS
(X1 + X2) (All Other Windings Grounded): 10.000 kV, 42.416 mA, 2.003 W, 13.618 Nf, 60 Seconds
PASS
(X3 + X4) (All Other Windings Grounded): 10.001 kV, 36.143 mA, 1.582 W, 11.257 Nf, 60 Seconds
PASS
(X5 + X6) (All Other Windings Grounded): 10.000 kV, 44.747 mA, 2.099 W, 14.505 Nf, 60 Seconds
PASS
(X7 + X8 + X9) (All Other Windings Grounded): 10.000 kV, 28.604 mA, 1.339 W, 8.392 Nf, 60 Seconds
PASS

TESTED BY: [REDACTED] DATE: 02/25/21

ABB Proprietary Uncontrolled When Printed or Transmitted Electronically

Car 113



Southeastern Pennsylvania Transportation Authority
PROPULSION TUNE UP FORMS
Silverliner IV MU Locomotives

9. Test Dynamic Brake Pressure Switch

DBPS P/U @ 107PSI D/O @ 103PSI Reading _____ P/U Reading _____ D/O

10. P3 Pot Test

Quick nip spec is 11.2 VDC +/- .3VDC Reading _____
10 PSI spec is 9.5 VDC Reading _____
20 PSI spec is 8.1 VDC Reading _____
30 PSI spec is 6.5 VDC Reading _____
40 PSI spec is 5.1 VDC Reading _____
50 PSI spec is 3.5 VDC Reading _____
60 PSI spec is 2.3 VDC Reading _____

11. Cam Controller Notch Down Test

Notch down from Position 17 - 1 in approx. 6-7 seconds Go/No Go Reading _____

12. Blending Valve Calibration

Calibrate blending valve according to procedures Go/No Go Reading _____

13. Read Roof Resistors

Read from B1 moveable to B2 moveable

Cam Position	Resistance	Reading
17 =	4.317Ω	4.342
16 =	3.255Ω	3.306
15 =	2.443Ω	2.530
14 =	2.060Ω	1.958
13 =	1.776Ω	1.681
12 =	1.553Ω	1.469
11 =	1.333Ω	1.467
10 =	1.149Ω	1.077
9 =	1.000Ω	.941
8 =	0.882Ω	.817
7 =	0.730Ω	.691

Car 113



Southeastern Pennsylvania Transportation Authority
PROPULSION TUNE UP FORMS
Silverliner IV MU Locomotives

6 =	0.620Ω	Reading <u>.634</u>
5 =	0.538Ω	Reading <u>.848</u>
4 =	0.477Ω	Reading <u>.706</u>
3 =	0.444Ω	Reading <u>.704</u>
2 =	0.361Ω	Reading <u>.427</u>
1 =	0.314Ω	Reading <u>.298</u>

Read Roof Resistors Individually

R1 - R2 = 1.062Ω	Reading <u>1.054</u>
R2 - R3 = 0.812Ω	Reading <u>.785</u>
R3 - R4 = 0.383Ω	Reading <u>.577</u>
R4 - R5 = 0.284Ω	Reading <u>.280</u>
R5 - R6 = 0.223Ω	Reading <u>.220</u>
R6 - R7 = 0.220Ω	Reading <u>.245</u>
R7 - R8 = 0.184Ω	Reading <u>.239</u>
R8 - R9 = 0.149Ω	Reading <u>.149</u>
R9 - R10 = 0.686Ω	Reading <u>.659</u>
R10 - B1 = 0.305Ω	Reading <u>.352</u>
BVRP	Reading _____
Megger B1 to Ground	Reading _____
Megger B2 to Ground	Reading _____

14. End Door Bypass Test

Complete End Door Bypass Test according to procedure Go/No Go Reading _____

15. A-1 Only Test

Check TXS output.
Single Cars - Ignitron Tubes
Remove 502 card -- use card extender

A. READ PINS 12 AND 14 ... 90 VAC	Reading _____
B. READ PINS 30 AND 34 ... 65 VAC	Reading _____