Bildal Electricals Private Limited

TEST REPORT

SCOPE OF WORK
FAA Certification Testing of the L-830/1-4, L-830/1-6, L-830/1-16, and L-830/1-18 Isolation Transformers.

REPORT NUMBER
105069753CRT-001

ISSUE DATE
14-Dec-2022

PAGES
38

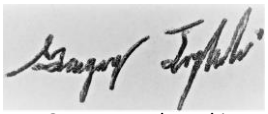
DOCUMENT CONTROL NUMBER
NA

Test Report			
Company Name	Bildal Electricals Private Limited	**Test Location**	Intertek Testing Services NA
Address	Extension II,152 Udyog Kendra	**Address**	3933 US Rt 11
	Ecotech III, Greater Noida		Cortland, NY 13045
	Gautam Budh Nagar 201306		USA
	India		
Client Contact	Naveen Goel	**Quote Number**	Qu-01264579
Phone	+91-9811013857	**Test Start Date**	July 11, 2022
Email	bildal@airfieldlight.in	**Completion Date**	December 14, 2022

Standard(s)
U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular, Specification for Series to Series Isolation Transformers for Airport Lighting Systems, AC No. 150/5345-47C dated 7/22/2011.

			Result			
Spec.	**Test name**	**Clause**	**10/15W**	**100W**	**150W**	**200W**
47C	Visual Exam	3.0	Pass	Pass	Pass	Pass
47C	Characteristics Test - 50Hz	4.2.1	Pass	Pass	Pass	Pass
47C	Characteristics Test - 60Hz	4.2.1	Pass	Pass	Pass	Pass
47C	Shock Test	4.2.2	Pass	Pass	Pass	Pass
47C	Transformer Lead Rigidity Test	4.2.2.1	Pass	Pass	Pass	Pass
47C	Post Shock / Rigidity Test - 60Hz	4.2.3	Pass	Pass	Pass	Pass
47C	Insulation Resistance - 60Hz	4.2.4	Pass	Pass	Pass	Pass
47C	Temperature Rise - 60Hz	4.2.5	Pass	Pass	Pass	Pass

Results Key	
Pass	Compliant
Fail	Non-compliant
TBD	Compliance not determined
NT	Not tested in this project
NA	Test not applicable



Gregory Trykowski
Engineer
Lighting

Christopher Metcalf
Engineering Supervisor
Lighting

Sample Information				
Date Rec.	Intertek ID	Description	Condition	Model No.*
6/30/22	CRT2206301329-001-001 thru -003	10/15W Transformer, 50/60Hz	Production	BE015661/BE015661B
6/30/22	CRT2206301329-001-004 thru -006	100W Transformer, 50/60Hz	Production	BE100667/BE100667B
6/30/22	CRT2206301329-002-001 thru -003	150W Transformer, 50/60Hz	Production	BE150669/BE150669B
6/30/22	CRT2206301329-002-004 thru -006	200W Transformer, 50/60Hz	Production	BE2006612/BE2006612B
9/7/22	CRT2209071038-001-1 thru -3	200W Transformer, 50/60Hz	Production	BE2006612/BE2006612B
9/7/22	CRT2209071038-001-4 thru -6	10/15W Transformer, 50/60Hz	Production	BE015661/BE015661B

*B at the end of the model denotes 60Hz

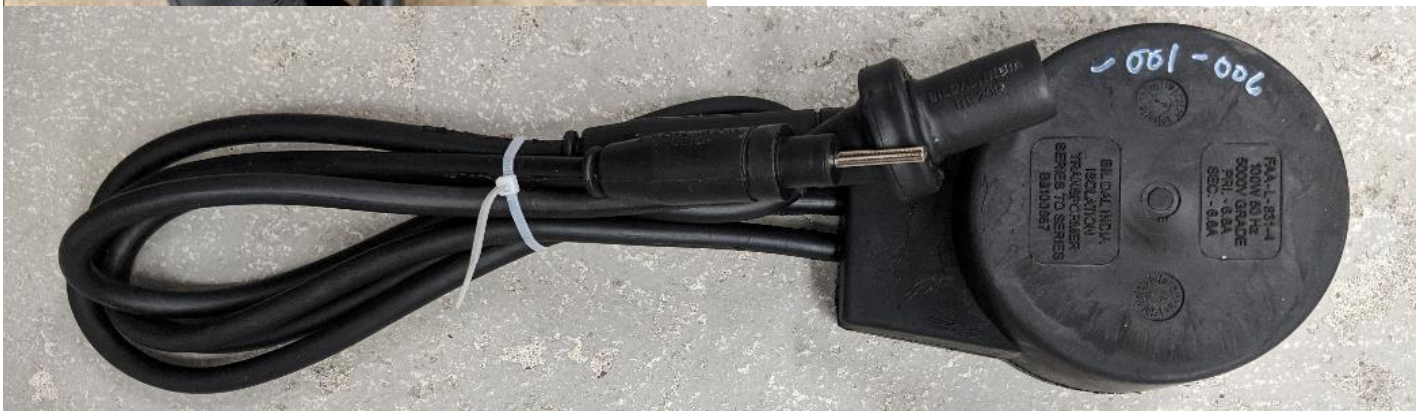
Further Sample Description	
Type:	L-830/1-4, L-830/1-6, L-830/1-16, L-830/1-18
Electrical Input:	6.6A, Bildal L-823 Style 2 and 9 (8 AWG 19 Strand)
Electrical Output:	6.6A, Bildal L-823 Style 7 (14 AWG 7 Strand)
Casting Material:	Exxon Mobil, TPV, Santoprene 101-73 (transformer casing) and 101-87 (cables)

Sample Modification Log	
Date	Modification description
7/14/22	7/14/22 10/15W characteristics failure - output current.
7/14/22	7/14/22 200W post shock/rigidity test failure - no output.

Picture(s)


FAA L-831-16
15W 50 Hz
5000V GRADE
PRI - 6.6A
SEC. - 6.6A
BIL DAL INDIA
ISOLATION
TRANSFORMER
SERIES TO SERIES
BE015661


BIL DAL INDIA
ISOLATION
TRANSFORMER
SERIES TO SERIES
BE100667




BILDAL INDIA
ISOLATION
TRANSFORMER
SERIES TO SERIES


BILDAL INDIA
ISOLATION
TRANSFORMER
SERIES TO SERIES


FAA-L-823
STYLE-2

Visual Exam

Ref. Para.	Requirement	Measured or Observed	Result (P/F)
3.1	Encapsulated in a watertight case with rubber (or an equivalent rubber-like material)	Observed	Pass
	Connectors molded on the primary and secondary leads	Observed	Pass
3.3	Transformers must be designed and constructed so that no parts will work loose in service	Observed	Pass
	All transformer electrical connections must be permanent	Observed	Pass
	Transformers must be designed to meet this specification when operated in any orientation	Observed	Pass
3.3.1	The transformer primary and secondary windings must be insulated from each other and the core	Client provided document-ation	Pass
3.4.1 Case	Transformers must be encapsulated in a permanently sealed watertight case	Observed	Pass
	No portion of the transformer case may be less than 0.25 inch (6.35 mm) thick	Client provided document-ation	Pass
	Must be free of any cracks, blisters, and holes.	Observed	Pass
	Material formed directly on the core/coil assembly or pre-formed and compound filled.	Direct formed (provided by client)	Pass
	Must be a black cross-linked polychloroprene compound at a minimum.	Observed	Pass
	Durometer hardness must be 75 ± 10 measured per procedure in ASTM D 2240. Requirement can be waved if insulation samples have passed shock and rigidity.	Shock and Rigidity Pass	Pass
	Must easily fit into a cylinder 8 inches (20.3 cm) diameter by 10 inches (25.4 cm) height	Observed	Pass
	Lead reinforcing area must be at least 25% greater than the outside diameter of the connecting leads	Measured	Pass
	Reinforcement may be a cone around individual leads or a continuous ridge enclosing all three leads	Continuous	Pass
	Reinforced area must form an integral bond with the cable sheath inside the cone or ridge	Observed	Pass
	The case of the completed transformer must be firm to the touch at all points and show no permanent indentation marks when subjected to finger pressure	Observed	Pass
3.4.2 Leads	The transformer must be provided with a two conductor secondary lead and two single conductor primary leads	Observed	Pass
	All three leads must emerge from one end of the transformer	Observed	Pass
3.4.2.1 Primary Leads	Equip one primary lead (H1) with a Style 2 plug type connector per AC 150/5345-26	Observed	Pass
	Equip the other primary lead (H2) with a Style 9 receptacle per AC 150/5345-26	Observed	Pass
	Use No. 8 American Wire Gauge (AWG) wire (minimum 6 millimeters squared (mm2)), 19 strand minimum cable insulated for not less than 5,000 volts and conforming to:	8 AWG 19 Strand, Client provided document-ation	Pass
	ICEA S-96-659/NEMA WC 71, Standard for Non-shielded Cables Rated 2001-5000 Volts for use in the Distribution of Electrical Energy. Other insulation materials may be used provided that they meet or exceed the physical and electrical requirements	Client provided document-ation	Pass
	Extend each primary winding lead, including the connector, 24.0 inches ± 3.0 inches (60 cm ± 7.5 cm) beyond the transformer housing	23.9"	Pass
3.4.2.2 Secondary Leads	The transformer secondary lead must be equipped with a Style 7 or 8 receptacle per AC 150/5345-26	Observed	Pass
	The transformer secondary leads must be two-conductor No. 12 or 14 AWG (minimum 2 mm2) 600 volt rated cable meeting the requirements of ICEA S-95-658/NEMA WC-70. Other insulation materials may be used provided that they meet or exceed the physical and electrical requirements in the ICEA specification	14 AWG, Client provided document-ation	Pass
	The secondary lead cable, including the cable connector, must be extended 48.0 in. ± 3.0 in. (120 cm ± 7.5 cm) from the transformer housing	47.5"	Pass
3.4.2.3 Protective Caps	A water resistant cap must be supplied that protects the transformer lead connectors mating parts from both moisture and dirt during shipping and handling	Observed	Pass
	Caps must be securely held in place by cap friction fit, heat shrink tubing, or electrical tape	Observed	Pass
	If electrical tape is used to secure a cap, the tape adhesive must not leave residues that collect dirt or inhibit the adhesion of cable wraps	Not observed	NA

3.6 Nameplate	Transformer markings must be molded on the surface of the transformer case	Observed	Pass
	Character Height (inches): Recommended 0.08 / Minimum 0.05	0.11"	Pass
	Specification L-830/L-831 (L-830 or L-831)	Client provided updated dual-rating labelling	Pass
	Transformer Rating 10/15W - 50/60Hz, 100W - 50/60Hz, 150W - 50/60Hz, 200W - 50/60Hz (Watts - Frequency)	Client provided updated dual-rating labelling	Pass
	Federal Stock Number _____ (Optional)	Not observed	NA
	Manufacturer's Part No. BE015661, BE100667, BE150669, BE2006612	Observed	Pass
	Manufacturer's Name or Trademark BILDAL	Observed	Pass
	Made in INDIA (Country of origin)	Observed	Pass
	Primary amperes 6.6A	Observed	Pass
	Secondary amperes 6.6A	Observed	Pass
	Volts 5000 50 or 60 Hz	Observed	Pass
	(Optional) Order/Contract No. _____	Not observed	NA

Complies: ☑ YES ☐ NO

Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	1, 2			Sample No:	CRT2206301329-001-001, -004, CRT2206301329-002-001, -004
Amb (ºC):	NA	RH%	NA	Completion Date:	7/11/2022, 7/19/2022

Characteristics Test 50Hz

The samples must be tested to demonstrate their electrical characteristics are per Table 2
The transformers must be operated at room temperature (in an area as draft free as possible) with their rated load (see Table 2) connected to the secondary winding
Measurements must be taken only when the transformer windings have reached their normal operating temperature

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	39.2	7:00	38.0	7:00	39.0
8:00	39.1	8:00	38.3	8:00	39.1
9:00	39.2	9:00	38.2	9:00	39.1
10:00	39.2	10:00	38.2	10:00	39.0

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-831-16	10/15	Watts	6.6	Amps	6.6	Amps	50	Hertz	0.34	Ohms

	Sample			
Measured	4	5	6	Req.
Frequency (Hz)	50	50	50	NA
Input Volts (Vac)	2.96	2.97	2.99	NA
Input Amps (Aac)	6.61	6.60	6.61	NA
Input Watts (W)	19.3	19.3	19.4	NA
Input PF	0.9815	0.9844	0.9851	≥0.95
Output Volts (Vac)	2.19	2.19	2.20	NA
Output Amps (Aac)	6.61	6.60	6.60	6.53-6.67
Output Watts (W)	14.4	14.2	14.5	NA
Efficiency	0.75	0.74	0.75	≥0.70
Short Circuit Current (Aac)	6.64	6.64	6.64	6.6-7.1
Open Circuit Voltage (Vac)	5.54	5.49	5.47	8.0
Full Load Resistance	0.34	0.34	0.34	0.34

Complies: [✓] YES [ ] NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	20.5	RH%	61	Completion Date:	10/25/2022

Characteristics Test 50Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
-001-004		-001-005		-001-006	
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	35.3	7:00	34.4	7:00	33.9
8:00	35.3	8:00	34.3	8:00	33.9
9:00	35.2	9:00	34.3	9:00	33.8
10:00	35.2	10:00	34.3	10:00	33.8

After running 16hrs

Results 100W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-831-4	100	Watts	6.6	Amps	6.6	Amps	50	Hertz	2.44	Ohms

	Sample			
Measured	-001-004	-001-005	-001-006	Req.
Frequency (Hz)	50	50	50	NA
Input Volts (Vac)	18.02	18.07	18.07	NA
Input Amps (Aac)	6.60	6.61	6.60	NA
Input Watts (W)	118.5	118.8	119.1	NA
Input PF	0.9956	0.9951	0.9949	≥0.95
Output Volts (Vac)	16.08	16.09	16.12	NA
Output Amps (Aac)	6.59	6.59	6.57	6.53-6.67
Output Watts (W)	105.7	106.1	106.1	NA
Efficiency	0.89	0.89	0.89	≥0.85
Short Circuit Current (Aac)	6.68	6.68	6.68	6.6-7.1
Open Circuit Voltage (Vac)	22.21	22.03	21.18	70
Full Load Resistance	2.44	2.44	2.44	2.44

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S+h
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	3,4,5,6,7			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Characteristics Test 50Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
-002-001		-002-002		-002-003	
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	36.1	7:00	36.6	7:00	36.4
8:00	36.2	8:00	36.5	8:00	36.2
9:00	36.1	9:00	36.4	9:00	36.2
10:00	36.1	10:00	36.4	10:00	36.3

After running 16hrs

Results 150W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-831-18	150	Watts	6.6	Amps	6.6	Amps	50	Hertz	3.58	Ohms

	Sample			
Measured	-002-001	-002-002	-002-003	Req.
Frequency (Hz)	50	50	50	NA
Input Volts (Vac)	26.06	26.08	26.09	NA
Input Amps (Aac)	6.60	6.60	6.61	NA
Input Watts (W)	170.8	170.6	171.3	NA
Input PF	0.9927	0.9906	0.9840	≥0.95
Output Volts (Vac)	23.62	23.65	23.71	NA
Output Amps (Aac)	6.57	6.56	6.60	6.53-6.67
Output Watts (W)	155.2	155.0	156.4	NA
Efficiency	0.91	0.91	0.91	≥0.85
Short Circuit Current (Aac)	6.67	6.68	6.67	6.6-7.1
Open Circuit Voltage (Vac)	31.96	32.29	32.02	70
Full Load Resistance	3.58	3.58	3.58	3.58

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S+h
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	3,4,5,6,7			Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Characteristics Test 50Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	39.4	7:00	38.7	7:00	39.1
8:00	39.4	8:00	38.7	8:00	39.2
9:00	39.4	9:00	38.6	9:00	39.2
10:00	39.4	10:00	38.7	10:00	39.2

Results 200W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-831-6	200	Watts	6.6	Amps	6.6	Amps	50	Hertz	4.82	Ohms

	Sample			
Measured	1	2	3	Req.
Frequency (Hz)	50	50	50	NA
Input Volts (Vac)	33.68	33.73	33.58	NA
Input Amps (Aac)	6.60	6.60	6.61	NA
Input Watts (W)	220.9	221.4	219.9	NA
Input PF	0.9938	0.9947	0.9936	≥0.95
Output Volts (Vac)	31.25	31.32	31.15	NA
Output Amps (Aac)	6.57	6.58	6.55	6.53-6.67
Output Watts (W)	205.2	206	203.7	NA
Efficiency	0.93	0.93	0.93	≥90
Short Circuit Current (Aac)	6.65	6.65	6.65	6.6-7.1
Open Circuit Voltage (Vac)	42.72	$42.47	41.77	100
Full Load Resistance	4.82	4.82	4.82	4.82

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	20.5	RH%	61	Completion Date:	10/25/2022

Characteristics Test 60Hz

The samples must be tested to demonstrate their electrical characteristics are per Table 2
The transformers must be operated at room temperature (in an area as draft free as possible) with their rated load (see Table 2) connected to the secondary winding
Measurements must be taken only when the transformer windings have reached their normal operating temperature

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	29.5	7:00	30.3	7:00	27.8
8:00	29.6	8:00	30.4	8:00	28.1
9:00	29.6	9:00	30.2	9:00	27.8
10:00	29.2	10:00	30.3	10:00	28.1

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz	0.34	Ohms

	Sample			
Measured	4	5	6	Req.
Frequency (Hz)	60	60	60	NA
Input Volts (Vac)	3.04	3.03	3.03	NA
Input Amps (Aac)	6.60	6.61	6.60	NA
Input Watts (W)	19.77	19.63	19.62	NA
Input PF	0.9847	0.9814	0.9828	≥0.95
Output Volts (Vac)	2.22	2.18	2.19	NA
Output Amps (Aac)	6.62	6.62	6.62	6.53-6.67
Output Watts (W)	14.67	14.45	14.48	NA
Efficiency	0.74	0.74	0.74	≥0.70
Short Circuit Current (Aac)	6.67	6.70	6.70	6.6-7.1
Open Circuit Voltage (Vac)	6.44	6.48	6.39	8.0
Full Load Resistance	0.34	0.34	0.34	0.34

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Characteristics Test 60Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
-001-004		-001-005		-001-006	
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	35.3	7:00	34.4	7:00	33.9
8:00	35.3	8:00	34.3	8:00	33.9
9:00	35.2	9:00	34.3	9:00	33.8
10:00	35.2	10:00	34.3	10:00	33.8

After running 16hrs

Results 100W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz	2.44	Ohms

	Sample			
Measured	-001-004	-001-005	-001-006	Req.
Frequency (Hz)	60	60	60	NA
Input Volts (Vac)	18.10	18.05	18.11	NA
Input Amps (Aac)	6.61	6.60	$6.60	NA
Input Watts (W)	118.9	118.5	119.1	NA
Input PF	0.9944	0.9941	0.9943	≥0.95
Output Volts (Vac)	16.08	16.05	16.1	NA
Output Amps (Aac)	6.62	6.61	6.60	6.53-6.67
Output Watts (W)	106.4	106.0	106.5	NA
Efficiency	0.89	0.89	0.89	≥0.85
Short Circuit Current (Aac)	6.68	6.68	6.68	6.6-7.1
Open Circuit Voltage (Vac)	26.58	26.49	26.41	70
Full Load Resistance	2.44	2.44	2.44	2.44

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S+H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	3,4,5,6,7			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Characteristics Test 60Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
-002-001		-002-002		-002-003	
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	36.1	7:00	36.6	7:00	36.4
8:00	36.2	8:00	36.5	8:00	36.2
9:00	36.1	9:00	36.4	9:00	36.2
10:00	36.1	10:00	36.4	10:00	36.3

After running 16hrs

Results 150W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz	3.58	Ohms

	Sample			
Measured	-002-001	-002-002	-002-003	Req.
Frequency (Hz)	60	60	60	NA
Input Volts (Vac)	26.26	26.37	26.58	NA
Input Amps (Aac)	6.6	6.61	6.59	NA
Input Watts (W)	171.7	172.7	172.5	NA
Input PF	0.9916	0.9911	0.9896	≥0.95
Output Volts (Vac)	23.77	23.89	24.02	NA
Output Amps (Aac)	6.59	6.60	6.65	6.53-6.67
Output Watts (W)	156.6	157.5	160	NA
Efficiency	0.91	0.91	0.93	≥0.85
Short Circuit Current (Aac)	6.68	6.67	6.68	6.6-7.1
Open Circuit Voltage (Vac)	38.29	38.72	38.54	70
Full Load Resistance	3.58	3.58	3.58	3.58

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S+H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	3,4,5,6,7			Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Characteristics Test 60Hz (continued)

Results - stabilization

Temperature stabilization data (<2°C change over 3 hours)					
Time	Temp (˚C)	Time	Temp (˚C)	Time	Temp (˚C)
7:00	34.7	7:00	35.2	7:00	34.8
8:00	34.5	8:00	35.5	8:00	34.7
9:00	34.6	9:00	35.4	9:00	34.5
10:00	34.7	10:00	35.4	10:00	34.6

Results 200W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz	4.82	Ohms

	Sample			
Measured	1	2	3	Req.
Frequency (Hz)	60	60	60	NA
Input Volts (Vac)	33.94	33.91	33.91	NA
Input Amps (Aac)	6.60	6.60	6.61	NA
Input Watts (W)	222.2	222.2	222.4	NA
Input PF	0.9929	0.9931	0.9928	≥0.95
Output Volts (Vac)	31.45	31.43	31.47	NA
Output Amps (Aac)	6.59	6.60	6.60	6.53-6.67
Output Watts (W)	207.2	207.2	207.5	NA
Efficiency	0.93	0.93	0.93	≥90
Short Circuit Current (Aac)	6.65	6.65	6.65	6.6-7.1
Open Circuit Voltage (Vac)	50.91	49.89	50.33	100
Full Load Resistance	4.82	4.82	4.82	4.82

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Shock Test

The sample isolation transformers must be dropped twice from a height of 6 feet (2 meters) onto a smooth hardwood floor

The first drop must orient the transformer so it strikes on a bottom corner or location where damage from the core cutting into the case is most likely

The second drop must orient the transformer so it impacts on a side or location where damage to the windings is most likely to occur

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz	0.34	Ohms

	Sample		
Drop	4	5	6
1	✓	✓	✓
2	✓	✓	✓

Drop Height	
6.0	Ft.

Note: Drop one was on the corner.
Drop two was on the windings.

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	1,13			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	12.5	RH%	28	Completion Date:	10/21/2028

Shock Test (continued)

Results 100W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz	2.44	Ohms

	Sample		
Drop	-001-004	-001-005	-001-006
1	✓	✓	✓
2	✓	✓	✓

Drop Height	
6.0	Ft.

Note: Drop one was on the corner.
Drop two was on the windings.

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S-H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	1,3			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Shock Test (continued)

Results 150W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz	3.58	Ohms

	Sample		
Drop	-002-001	-002-002	-002-003
1	✓	✓	✓
2	✓	✓	✓

Drop Height	
6.0	Ft.

Note: Drop one was on the corner.
Drop two was on the windings.

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S-H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	1,3			Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Shock Test (continued)

Results 200W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz	4.82	Ohms

	Sample		
Drop	1	2	3
1	✓	✓	✓
2	✓	✓	✓

Drop Height	
6.0	Ft.

Note: Drop one was on the corner.
Drop two was on the windings.

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	1,13			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Transformer Lead Rigidity Test

All transformers leads must also be tested for lead rigidity after the shock test

Sequentially secure each transformer lead just below the connector in a clamp fastened to a vertical support

The transformer body must be released and allowed to free-fall from the clamp height

Repeat the test for each transformer lead

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz	0.34	Ohms

	Sample								
	4			5			6		
	Pri. 1	Pri. 2	Sec.	Pri. 3	Pri. 4	Sec.	Pri. 5	Pri. 6	Sec.
Drop	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damage	none	none	none	none	none	none	none	none	none

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	1,13			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Transformer Lead Rigidity Test (continued)

Results 100W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz	2.44	Ohms

	Sample								
	-001-004			-001-005			-001-006		
	Pri. 1	Pri. 2	Sec.	Pri. 3	Pri. 4	Sec.	Pri. 5	Pri. 6	Sec.
Drop	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damage	none	none	none	none	none	none	none	none	none

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S-H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	1,3			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Transformer Lead Rigidity Test (continued)

Results 150W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz	3.58	Ohms

	Sample								
	-002-001			-002-002			-002-003		
	Pri. 1	Pri. 2	Sec.	Pri. 3	Pri. 4	Sec.	Pri. 5	Pri. 6	Sec.
Drop	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damage	none	none	none	none	none	none	none	none	none

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S-H
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	1,3			Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Transformer Lead Rigidity Test (continued)

Results 200W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz	4.82	Ohms

	Sample								
	1			2			3		
	Pri. 1	Pri. 2	Sec.	Pri. 3	Pri. 4	Sec.	Pri. 5	Pri. 6	Sec.
Drop	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damage	none	none	none	none	none	none	none	none	none

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	S+H
Engineer:	Greg Trykowski			Signature or initials:	Gregory Trykowski
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	1,13			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Post Shock / Rigidity Test

After the completion of tests in paragraphs 4.2.2 and 4.2.2.1, the transformers must be tested to ensure they meet the secondary current requirements at full load (see Table 2).

A change of more than one percent from the test per paragraph 4.2.1 or evidence of damage to the case and attaching leads must be cause for rejection

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz	0.34	Ohms

	Sample			
Measured	-001-001	-001-002	-001-003	
Frequency (Hz)	60	60	60	
Input Amps (Aac)	6.61	6.60	6.61	
Output Volts (Vac)	2.17	2.19	2.19	
Output Amps (Aac)	6.63	6.62	6.62	
Output Watts (W)	14.4	14.5	14.5	
Full Load Resistance	0.34	0.34	0.34	
Initial Output Amps (Aac)	6.62	6.62	6.62	Req.
Percent Change (%)	-0.2%	0.0%	0.0%	≤ 1%

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Post Shock / Rigidity Test (continued)

Results 100W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz	2.44	Ohms

	Sample			
Measured	-001-004	-001-005	-001-006	
Frequency (Hz)	60	60	60	
Input Amps (Aac)	6.60	6.61	6.60	
Output Volts (Vac)	18.08	18.02	18.02	
Output Amps (Aac)	6.60	6.60	6.60	
Output Watts (W)	106.4	106.1	106.8	
Full Load Resistance	2.44	2.44	2.24	
Initial Output Amps (Aac)	6.60	6.61	6.60	Req.
Percent Change (%)	0.0%	0.0%	0.0%	≤ 1%

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Rudy Sporman			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	3,4,5,6			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Post Shock / Rigidity Test (continued)

Results 150W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz	3.58	Ohms

	Sample			
Measured	-002-001	-002-002	-002-003	
Frequency (Hz)	60	60	60	
Input Amps (Aac)	6.60	6.60	6.60	
Output Volts (Vac)	23.77	23.71	23.88	
Output Amps (Aac)	6.62	6.64	6.68	
Output Watts (W)	156.8	156.1	160.1	
Full Load Resistance	3.58	3.58	3.58	
Initial Output Amps (Aac)	6.59	6.60	6.65	Req.
Percent Change (%)	-0.5%	-0.6%	-0.4%	≤ 1%

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	SH
Engineer:	Rudy Sporman			Signature or initials:	RS
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	3,4,5,6			Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	21	RH%	67	Completion Date:	7/14/2022

Post Shock / Rigidity Test (continued)

Results 200W

Type	Wattage		Primary		Secondary		Frequency		Full Load	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz	4.82	Ohms

	Sample			
Measured				
Frequency (Hz)	60	60	60	
Input Amps (Aac)	6.61	6.60	6.60	
Output Volts (Vac)	31.39	31.44	31.33	
Output Amps (Aac)	6.59	6.59	6.58	
Output Watts (W)	206.7	207.2	206.5	
Full Load Resistance	4.82	4.82	4.82	
Initial Output Amps (Aac)	6.59	6.60	6.6	Req.
Percent Change (%)	0.0%	0.2%	0.3%	≤ 1%

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	4,7,10,11,12,13,14			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	21.5	RH%	28	Completion Date:	10/21/2022

Insulation Resistance

The sample transformers must be subjected to a 20-cycle insulation test

Mating test harness connectors that were previously subjected to "go" and "no go" gauges must be installed in the transformer lead connectors

The mating connectors must not be removed before completion of the 20 cycle testing. If the connectors are removed for any reason, tests must be repeated so both the transformers and connectors satisfactorily pass 20 continuous cycles

Transformers must be operated, with mating connectors installed, for a minimum of 6 hours at room temperature with the rated current in primary winding (see Table 2). The secondary windings of the transformers must be open-circuited

As soon as possible following the heating cycle, the transformers, with leads and connectors, must be completely submerged in water that is grounded at room temperature for 12 hours minimum

Ensure that all molded connections on the transformer leads and test harness are completely immersed in water during this test

The insulation resistance of each coil and lead assembly must be measured immediately after immersion with voltage applied per Table 3

Table 3. Insulation Resistance

Winding under Test	Voltage Applied (kV DC)	Minimum Insulation Resistance (Megohms)	Maximum Leakage Current (Micro amps)
Hot/Cold Primary for transformers up to 150 W	15.0	7500	2.0
Hot/Cold Secondary for transformers up to 150 W	5.0	2500	2.0
Hot/Cold Primary for transformers over 150 W	15.0	3000	5
Hot/Cold Secondary for transformers over 150W	5.0	1000	5

All measurements of the transformer insulation resistance must be made with direct current

The test voltage must be applied for 1 minute between each transformer winding and ground

The transformer winding not under test must be grounded and its connectors submerged in water

Insulation resistance at the test voltage must equal or exceed the minimum resistance values per Table 3. Alternatively, the leakage current must be less than or equal to the maximum leakage current values per Table 3

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz

	CRT2209071038-001-4		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.04	125.00	11/2/2022	14:00	0.18	83.33	0.04	125.00
2	11/3/2022	8:45	0.44	34.09	0.04	125.00	11/3/2022	15:00	0.38	39.47	0.06	83.33
3	11/4/2022	7:30	0.58	25.86	0.04	125.00	11/4/2022	14:30	0.52	28.85	0.06	83.33
4	11/5/2022	9:00	0.61	24.59	0.04	125.00	11/5/2022	16:00	0.66	22.73	0.08	62.50
5	11/6/2022	9:00	0.52	28.85	0.04	125.00	11/6/2022	16:00	0.51	29.41	0.06	83.33
6	11/7/2022	8:00	0.54	27.78	0.04	125.00	11/7/2022	14:30	0.36	41.67	0.04	125.00
7	11/8/2022	8:00	0.44	34.09	0.03	166.67	11/8/2022	14:30	0.38	39.47	0.02	250.00
8	11/9/2022	8:00	0.18	83.33	0.04	125.00	11/9/2022	14:30	0.20	75.00	0.06	83.33
9	11/10/2022	7:30	0.32	46.88	0.04	125.00	11/10/2022	14:30	0.44	34.09	0.06	83.33
10	11/11/2022	7:30	1.10	13.64	0.24	20.83	11/11/2022	14:30	1.20	12.50	0.03	166.67
11	11/12/2022	5:00	0.98	15.31	0.03	166.67	11/12/2022	12:30	0.64	23.44	0.06	83.33
12	11/13/2022	5:00	0.52	28.85	0.04	125.00	11/13/2022	13:00	0.44	34.09	0.04	125.00
13	11/14/2022	7:30	0.62	24.19	0.04	125.00	11/14/2022	14:30	0.38	39.47	0.04	125.00
14	11/15/2022	7:30	0.52	28.85	0.04	125.00	11/15/2022	14:30	0.54	27.78	0.04	125.00
15	11/16/2022	7:30	0.38	39.47	0.06	83.33	11/16/2022	14:30	0.32	46.88	0.02	250.00
16	11/17/2022	7:45	0.18	83.33	0.04	125.00	11/17/2022	14:30	0.28	53.57	0.04	125.00
17	11/18/2022	7:30	0.28	53.57	0.04	125.00	11/18/2022	14:30	0.22	68.18	0.03	166.67
18	11/19/2022	7:30	0.36	41.67	0.04	125.00	11/19/2022	14:30	0.34	44.12	0.04	125.00
19	11/20/2022	7:30	0.26	57.69	0.04	125.00	11/20/2022	14:30	0.34	44.12	0.04	125.00
20	11/21/2022	8:00	0.28	53.57	0.06	83.33	11/21/2022	14:30	0.28	53.57	0.04	125.00
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2209071038-001-5		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.08	187.50	0.03	166.67	11/2/2022	14:00	0.18	83.33	0.04	125.00
2	11/3/2022	8:45	0.24	62.50	0.04	125.00	11/3/2022	15:00	0.38	39.47	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	0.32	46.88	0.08	62.50
4	11/5/2022	9:00	0.22	68.18	0.04	125.00	11/5/2022	16:00	0.92	16.30	0.06	83.33
5	11/6/2022	9:00	0.92	16.30	0.06	83.33	11/6/2022	16:00	0.94	15.96	0.12	41.67
6	11/7/2022	8:00	0.88	17.05	0.06	83.33	11/7/2022	14:30	0.34	44.12	0.06	83.33
7	11/8/2022	8:00	0.46	32.61	0.04	125.00	11/8/2022	14:30	0.38	39.47	0.02	250.00
8	11/9/2022	8:00	0.48	31.25	0.20	25.00	11/9/2022	14:30	0.30	50.00	0.04	125.00
9	11/10/2022	7:30	0.38	39.47	0.04	125.00	11/10/2022	14:30	0.42	35.71	0.04	125.00
10	11/11/2022	7:30	1.10	13.64	0.04	125.00	11/11/2022	14:30	0.30	50.00	0.24	20.83
11	11/12/2022	5:00	0.32	46.88	0.03	166.67	11/12/2022	12:30	0.75	20.00	0.02	250.00
12	11/13/2022	5:00	0.48	31.25	0.04	125.00	11/13/2022	13:00	0.58	25.86	0.04	125.00
13	11/14/2022	7:30	0.32	46.88	0.04	125.00	11/14/2022	14:30	0.44	34.09	0.04	125.00
14	11/15/2022	7:30	0.52	28.85	0.04	125.00	11/15/2022	14:30	0.38	39.47	0.04	125.00
15	11/16/2022	7:30	0.52	28.85	0.04	125.00	11/16/2022	14:30	0.44	34.09	0.04	125.00
16	11/17/2022	7:45	0.28	53.57	0.02	250.00	11/17/2022	14:30	0.38	39.47	0.04	125.00
17	11/18/2022	7:30	0.36	41.67	0.02	250.00	11/18/2022	14:30	0.52	28.85	0.04	125.00
18	11/19/2022	7:30	0.38	39.47	0.04	125.00	11/19/2022	14:30	0.44	34.09	0.04	125.00
19	11/20/2022	7:30	0.22	68.18	0.04	125.00	11/20/2022	14:30	0.50	30.00	0.04	125.00
20	11/21/2022	8:00	0.34	44.12	0.03	166.67	11/21/2022	14:30	0.34	44.12	0.03	166.67
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2209071038-001-6		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.04	125.00	11/2/2022	14:00	0.22	68.18	0.06	83.33
2	11/3/2022	8:45	0.24	62.50	0.04	125.00	11/3/2022	15:00	0.18	83.33	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	0.18	83.33	0.04	125.00
4	11/5/2022	9:00	0.22	68.18	0.04	125.00	11/5/2022	16:00	0.14	107.14	0.04	125.00
5	11/6/2022	9:00	0.24	62.50	0.04	125.00	11/6/2022	16:00	0.16	93.75	0.12	41.67
6	11/7/2022	8:00	0.24	62.50	0.06	83.33	11/7/2022	14:30	0.32	46.88	0.06	83.33
7	11/8/2022	8:00	0.44	34.09	0.04	125.00	11/8/2022	14:30	0.52	28.85	0.04	125.00
8	11/9/2022	8:00	0.36	41.67	0.04	125.00	11/9/2022	14:30	0.48	31.25	0.02	250.00
9	11/10/2022	7:30	0.62	24.19	0.04	125.00	11/10/2022	14:30	1.10	13.64	0.04	125.00
10	11/11/2022	7:30	1.10	13.64	0.26	19.23	11/11/2022	14:30	0.50	30.00	0.28	17.86
11	11/12/2022	5:00	0.40	37.50	0.04	125.00	11/12/2022	12:30	0.38	39.47	0.04	125.00
12	11/13/2022	5:00	0.38	39.47	0.04	125.00	11/13/2022	13:00	0.40	37.50	0.04	125.00
13	11/14/2022	7:30	0.38	39.47	0.04	125.00	11/14/2022	14:30	0.56	26.79	0.03	166.67
14	11/15/2022	7:30	0.42	35.71	0.04	125.00	11/15/2022	14:30	0.48	31.25	0.04	125.00
15	11/16/2022	7:30	0.50	30.00	0.03	166.67	11/16/2022	14:30	0.48	31.25	0.04	125.00
16	11/17/2022	7:45	0.36	41.67	0.04	125.00	11/17/2022	14:30	0.52	28.85	0.03	166.67
17	11/18/2022	7:30	0.50	30.00	0.04	125.00	11/18/2022	14:30	0.48	31.25	0.04	125.00
18	11/19/2022	7:30	0.62	24.19	0.03	166.67	11/19/2022	14:30	0.38	39.47	0.04	125.00
19	11/20/2022	7:30	0.38	39.47	0.04	125.00	11/20/2022	14:30	0.38	39.47	0.04	125.00
20	11/21/2022	8:00	0.28	53.57	0.04	125.00	11/21/2022	14:30	0.22	68.18	0.04	125.00
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

Complies:	YES	NO

Tested By:	S. Hammond			Signature or initials:	
Engineer:	Greg Trykowski			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Equipment Used:	15,16,17			Sample No:	CRT2209071038-001-(4-6)
Amb (ºC):	15 to 25	RH%	25 to 75	Completion Date:	11/22/2022

Insulation Resistance (continued)

Results 100W

Type	Wattage		Primary		Secondary		Frequency	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz

	CRT2206301329-001-004		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.04	125.00	11/2/2022	14:00	0.26	57.69	0.04	125.00
2	11/3/2022	8:45	0.38	39.47	0.04	125.00	11/3/2022	15:00	0.42	35.71	0.04	125.00
3	11/4/2022	7:30	0.42	35.71	0.04	125.00	11/4/2022	14:30	0.38	39.47	0.06	83.33
4	11/5/2022	9:00	0.40	37.50	0.04	125.00	11/5/2022	16:00	0.38	39.47	0.12	41.67
5	11/6/2022	9:00	0.42	35.71	0.04	125.00	11/6/2022	16:00	0.42	35.71	0.12	41.67
6	11/7/2022	8:00	0.42	35.71	0.04	125.00	11/7/2022	14:30	0.44	34.09	0.12	41.67
7	11/8/2022	8:00	0.34	44.12	0.04	125.00	11/8/2022	14:30	0.40	37.50	0.06	83.33
8	11/9/2022	8:00	0.48	31.25	0.04	125.00	11/9/2022	14:30	0.26	57.69	0.02	250.00
9	11/10/2022	7:30	0.60	25.00	0.04	125.00	11/10/2022	14:30	0.50	30.00	0.04	125.00
10	11/11/2022	7:30	0.78	19.23	0.18	27.78	11/11/2022	14:30	1.20	12.50	0.12	41.67
11	11/12/2022	5:00	0.98	15.31	0.04	125.00	11/12/2022	12:30	0.84	17.86	0.04	125.00
12	11/13/2022	5:00	0.58	25.86	0.05	100.00	11/13/2022	13:00	0.52	28.85	0.04	125.00
13	11/14/2022	7:30	0.66	22.73	0.04	125.00	11/14/2022	14:30	0.75	20.00	0.04	125.00
14	11/15/2022	7:30	0.56	26.79	0.04	125.00	11/15/2022	14:30	0.50	30.00	0.04	125.00
15	11/16/2022	7:30	0.47	31.91	0.03	166.67	11/16/2022	14:30	0.54	27.78	0.02	250.00
16	11/17/2022	7:45	0.16	93.75	0.02	250.00	11/17/2022	14:30	0.46	32.61	0.04	125.00
17	11/18/2022	7:30	0.48	31.25	0.04	125.00	11/18/2022	14:30	0.46	32.61	0.04	125.00
18	11/19/2022	7:30	0.38	39.47	0.04	125.00	11/19/2022	14:30	0.30	50.00	0.03	166.67
19	11/20/2022	7:30	0.46	32.61	0.02	250.00	11/20/2022	14:30	0.62	24.19	0.04	125.00
20	11/21/2022	8:00	0.46	32.61	0.04	125.00	11/21/2022	14:30	0.42	35.71	0.04	125.00
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2206301329-001-005		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.04	125.00	11/2/2022	14:00	0.24	62.50	0.04	125.00
2	11/3/2022	8:45	0.22	68.18	0.04	125.00	11/3/2022	15:00	0.52	28.85	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	0.40	37.50	0.04	125.00
4	11/5/2022	9:00	0.30	50.00	0.04	125.00	11/5/2022	16:00	0.88	17.05	0.04	125.00
5	11/6/2022	9:00	0.64	23.44	0.04	125.00	11/6/2022	16:00	0.90	16.67	0.14	35.71
6	11/7/2022	8:00	0.54	27.78	0.05	100.00	11/7/2022	14:30	0.82	18.29	0.08	62.50
7	11/8/2022	8:00	0.34	44.12	0.04	125.00	11/8/2022	14:30	0.34	44.12	0.04	125.00
8	11/9/2022	8:00	0.38	39.47	0.04	125.00	11/9/2022	14:30	0.14	107.14	0.02	250.00
9	11/10/2022	7:30	0.26	57.69	0.04	125.00	11/10/2022	14:30	0.48	31.25	0.04	125.00
10	11/11/2022	7:30	0.94	15.96	0.14	35.71	11/11/2022	14:30	0.70	21.43	0.30	16.67
11	11/12/2022	5:00	0.62	24.19	0.04	125.00	11/12/2022	12:30	0.44	34.09	0.04	125.00
12	11/13/2022	5:00	0.58	25.86	0.04	125.00	11/13/2022	13:00	0.62	24.19	0.03	166.67
13	11/14/2022	7:30	0.44	34.09	0.04	125.00	11/14/2022	14:30	0.56	26.79	0.04	125.00
14	11/15/2022	7:30	0.38	39.47	0.04	125.00	11/15/2022	14:30	0.48	31.25	0.04	125.00
15	11/16/2022	7:30	0.56	26.79	0.04	125.00	11/16/2022	14:30	0.56	26.79	0.04	125.00
16	11/17/2022	7:45	0.26	57.69	0.04	125.00	11/17/2022	14:30	0.32	46.88	0.04	125.00
17	11/18/2022	7:30	0.52	28.85	0.04	125.00	11/18/2022	14:30	0.50	30.00	0.04	125.00
18	11/19/2022	7:30	0.46	32.61	0.04	125.00	11/19/2022	14:30	0.38	39.47	0.04	125.00
19	11/20/2022	7:30	0.50	30.00	0.04	125.00	11/20/2022	14:30	0.48	31.25	0.04	125.00
20	11/21/2022	8:00	0.34	44.12	0.04	125.00	11/21/2022	14:30	0.44	34.09	0.02	250.00
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2206301329-001-006		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.04	125.00	11/2/2022	14:00	0.26	57.69	0.06	83.33
2	11/3/2022	8:45	0.24	62.50	0.04	125.00	11/3/2022	15:00	0.56	26.79	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	0.45	33.33	0.06	83.33
4	11/5/2022	9:00	0.24	62.50	0.06	83.33	11/5/2022	16:00	0.98	15.31	0.04	125.00
5	11/6/2022	9:00	0.64	23.44	0.06	83.33	11/6/2022	16:00	0.78	19.23	0.08	62.50
6	11/7/2022	8:00	0.70	21.43	0.06	83.33	11/7/2022	14:30	0.76	19.74	0.04	125.00
7	11/8/2022	8:00	0.12	125.00	0.04	125.00	11/8/2022	14:30	0.16	93.75	0.04	125.00
8	11/9/2022	8:00	0.48	31.25	0.04	125.00	11/9/2022	14:30	0.48	31.25	0.04	125.00
9	11/10/2022	7:30	0.40	37.50	0.04	125.00	11/10/2022	14:30	0.58	25.86	0.04	125.00
10	11/11/2022	7:30	0.70	21.43	0.08	62.50	11/11/2022	14:30	0.80	18.75	0.03	166.67
11	11/12/2022	5:00	0.44	34.09	0.02	250.00	11/12/2022	12:30	0.44	34.09	0.04	125.00
12	11/13/2022	5:00	0.52	28.85	0.04	125.00	11/13/2022	13:00	0.56	26.79	0.04	125.00
13	11/14/2022	7:30	0.47	31.91	0.02	250.00	11/14/2022	14:30	0.70	21.43	0.04	125.00
14	11/15/2022	7:30	0.48	31.25	0.04	125.00	11/15/2022	14:30	0.66	22.73	0.04	125.00
15	11/16/2022	7:30	0.32	46.88	0.04	125.00	11/16/2022	14:30	0.56	26.79	0.03	166.67
16	11/17/2022	7:45	0.18	83.33	0.02	250.00	11/17/2022	14:30	0.23	65.22	0.04	125.00
17	11/18/2022	7:30	0.28	53.57	0.04	125.00	11/18/2022	14:30	0.18	83.33	0.02	250.00
18	11/19/2022	7:30	0.52	28.85	0.04	125.00	11/19/2022	14:30	0.22	68.18	0.04	125.00
19	11/20/2022	7:30	0.40	37.50	0.04	125.00	11/20/2022	14:30	0.42	35.71	0.04	125.00
20	11/21/2022	8:00	0.50	30.00	0.04	125.00	11/21/2022	14:30	0.22	68.18	0.03	166.67
	Specification Max. ≤150W		≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

Complies: YES | NO

Tested By:	S. Hammond			Signature or initials:	SH
Engineer:	Greg Trykowski			Signature or initials:	GT
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	15,16,17			Sample No:	CRT2206301329-001-004 thru -006
Amb (ºC):	15 to 25	RH%	25 to 75	Completion Date:	11/22/2022

Insulation Resistance (continued)

Results 150W

Type	Wattage		Primary		Secondary		Frequency	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz

	CRT2206301329-002-001		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.14	107.14	0.02	250.00	11/2/2022	14:00	0.18	83.33	0.06	83.33
2	11/3/2022	8:45	0.26	57.69	0.10	50.00	11/3/2022	15:00	0.32	46.88	0.04	125.00
3	11/4/2022	7:30	0.28	53.57	0.14	35.71	11/4/2022	14:30	0.30	50.00	0.08	62.50
4	11/5/2022	9:00	0.33	45.45	0.12	41.67	11/5/2022	16:00	0.98	15.31	0.08	62.50
5	11/6/2022	9:00	0.64	23.44	0.10	50.00	11/6/2022	16:00	0.92	16.30	0.08	62.50
6	11/7/2022	8:00	0.70	21.43	0.12	41.67	11/7/2022	14:30	0.88	17.05	0.08	62.50
7	11/8/2022	8:00	0.38	39.47	0.04	125.00	11/8/2022	14:30	0.34	44.12	0.04	125.00
8	11/9/2022	8:00	0.28	53.57	0.02	250.00	11/9/2022	14:30	0.16	93.75	0.04	125.00
9	11/10/2022	7:30	0.32	46.88	0.04	125.00	11/10/2022	14:30	0.40	37.50	0.04	125.00
10	11/11/2022	7:30	0.42	35.71	0.08	62.50	11/11/2022	14:30	1.60	9.38	0.13	38.46
11	11/12/2022	5:00	0.84	17.86	0.03	166.67	11/12/2022	12:30	0.75	20.00	0.03	166.67
12	11/13/2022	5:00	0.48	31.25	0.04	125.00	11/13/2022	13:00	0.75	20.00	0.04	125.00
13	11/14/2022	7:30	0.66	22.73	0.04	125.00	11/14/2022	14:30	0.86	17.44	0.05	100.00
14	11/15/2022	7:30	0.52	28.85	0.04	125.00	11/15/2022	14:30	0.52	28.85	0.04	125.00
15	11/16/2022	7:30	0.55	27.27	0.04	125.00	11/16/2022	14:30	0.66	22.73	0.04	125.00
16	11/17/2022	7:45	0.18	83.33	0.02	250.00	11/17/2022	14:30	0.48	31.25	0.04	125.00
17	11/18/2022	7:30	0.48	31.25	0.03	166.67	11/18/2022	14:30	0.52	28.85	0.04	125.00
18	11/19/2022	7:30	0.22	68.18	0.04	125.00	11/19/2022	14:30	0.52	28.85	0.04	125.00
19	11/20/2022	7:30	0.60	25.00	0.04	125.00	11/20/2022	14:30	0.37	40.54	0.04	125.00
20	11/21/2022	8:00	0.62	24.19	0.04	125.00	11/21/2022	14:30	0.52	28.85	0.04	125.00
Specification Max. ≤150W			≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2206301329-002-002		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.14	107.14	0.02	250.00	11/2/2022	14:00	0.18	83.33	0.04	125.00
2	11/3/2022	8:45	0.22	68.18	0.04	125.00	11/3/2022	15:00	0.16	93.75	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	0.30	50.00	0.04	125.00
4	11/5/2022	9:00	0.24	62.50	0.04	125.00	11/5/2022	16:00	0.88	17.05	0.04	125.00
5	11/6/2022	9:00	0.34	44.12	0.04	125.00	11/6/2022	16:00	0.72	20.83	0.08	62.50
6	11/7/2022	8:00	0.40	37.50	0.04	125.00	11/7/2022	14:30	0.76	19.74	0.06	83.33
7	11/8/2022	8:00	0.44	34.09	0.04	125.00	11/8/2022	14:30	0.44	34.09	0.04	125.00
8	11/9/2022	8:00	0.16	93.75	0.04	125.00	11/9/2022	14:30	0.52	28.85	0.04	125.00
9	11/10/2022	7:30	0.14	107.14	0.02	250.00	11/10/2022	14:30	0.22	68.18	0.04	125.00
10	11/11/2022	7:30	0.36	41.67	0.06	83.33	11/11/2022	14:30	0.78	19.23	0.24	20.83
11	11/12/2022	5:00	0.24	62.50	0.04	125.00	11/12/2022	12:30	0.56	26.79	0.04	125.00
12	11/13/2022	5:00	0.38	39.47	0.04	125.00	11/13/2022	13:00	0.42	35.71	0.04	125.00
13	11/14/2022	7:30	0.30	50.00	0.04	125.00	11/14/2022	14:30	0.38	39.47	0.04	125.00
14	11/15/2022	7:30	0.38	39.47	0.03	166.67	11/15/2022	14:30	0.38	39.47	0.04	125.00
15	11/16/2022	7:30	0.28	53.57	0.02	250.00	11/16/2022	14:30	0.38	39.47	0.04	125.00
16	11/17/2022	7:45	0.25	60.00	0.02	250.00	11/17/2022	14:30	0.38	39.47	0.02	250.00
17	11/18/2022	7:30	0.26	57.69	0.04	125.00	11/18/2022	14:30	0.52	28.85	0.03	166.67
18	11/19/2022	7:30	0.28	53.57	0.04	125.00	11/19/2022	14:30	0.40	37.50	0.03	166.67
19	11/20/2022	7:30	0.33	45.45	0.04	125.00	11/20/2022	14:30	0.42	35.71	0.04	125.00
20	11/21/2022	8:00	0.28	53.57	0.04	125.00	11/21/2022	14:30		#DIV/0!		#DIV/0!
Specification Max. ≤150W			≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

	CRT2206301329-002-003		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.22	68.18	0.06	83.33	11/2/2022	14:00	0.22	68.18	0.04	125.00
2	11/3/2022	8:45	0.24	62.50	0.06	83.33	11/3/2022	15:00	0.48	31.25	0.04	125.00
3	11/4/2022	7:30	0.24	62.50	0.06	83.33	11/4/2022	14:30	0.50	30.00	0.06	83.33
4	11/5/2022	9:00	0.24	62.50	0.06	83.33	11/5/2022	16:00	0.32	46.88	0.06	83.33
5	11/6/2022	9:00	0.25	60.00	0.04	125.00	11/6/2022	16:00	0.34	44.12	0.10	50.00
6	11/7/2022	8:00	0.28	53.57	0.04	125.00	11/7/2022	14:30	0.34	44.12	0.08	62.50
7	11/8/2022	8:00	0.52	28.85	0.04	125.00	11/8/2022	14:30	0.50	30.00	0.03	166.67
8	11/9/2022	8:00	0.20	75.00	0.04	125.00	11/9/2022	14:30	0.28	53.57	0.04	125.00
9	11/10/2022	7:30	0.44	34.09	0.04	125.00	11/10/2022	14:30	0.26	57.69	0.04	125.00
10	11/11/2022	7:30	0.36	41.67	0.08	62.50	11/11/2022	14:30	0.44	34.09	0.04	125.00
11	11/12/2022	5:00	0.28	53.57	0.04	125.00	11/12/2022	12:30	0.72	20.83	0.04	125.00
12	11/13/2022	5:00	0.44	34.09	0.03	166.67	11/13/2022	13:00	0.38	39.47	0.02	250.00
13	11/14/2022	7:30	0.52	28.85	0.04	125.00	11/14/2022	14:30	0.52	28.85	0.04	125.00
14	11/15/2022	7:30	0.62	24.19	0.04	125.00	11/15/2022	14:30	0.48	31.25	0.04	125.00
15	11/16/2022	7:30	0.38	39.47	0.03	166.67	11/16/2022	14:30	0.48	31.25	0.04	125.00
16	11/17/2022	7:45	0.14	107.14	0.02	250.00	11/17/2022	14:30	0.24	62.50	0.04	125.00
17	11/18/2022	7:30	0.38	39.47	0.04	125.00	11/18/2022	14:30	0.38	39.47	0.04	125.00
18	11/19/2022	7:30	0.22	68.18	0.04	125.00	11/19/2022	14:30	0.40	37.50	0.04	125.00
19	11/20/2022	7:30	0.52	28.85	0.04	125.00	11/20/2022	14:30	0.28	53.57	0.04	125.00
20	11/21/2022	8:00	0.42	35.71	0.04	125.00	11/21/2022	14:30	0.38	39.47	0.04	125.00
Specification Max. ≤150W			≤2.0	≥7.5	≤2.0	≥2.5			≤2.0	≥7.5	≤2.0	≥2.5

Complies: YES NO

Tested By:	S. Hammond	Signature or initials:	SH
Engineer:	Greg Trykowski	Signature or initials:	GT
Reviewed By:	cwm	Signature or initials:	cwm
Equipment Used:	15,16,17	Sample No:	CRT2206301329-002-001 thru -003
Amb (ºC):	15 to 25	RH%: 25 to 75	Completion Date: 11/22/2022

Insulation Resistance (continued)

Results 200W

Type	Wattage		Primary		Secondary		Frequency	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz

	CRT2209071038-001-1		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.30	50.00	0.06	83.33	11/2/2022	14:00	0.28	53.57	0.06	83.33
2	11/3/2022	8:45	0.48	31.25	0.04	125.00	11/3/2022	15:00	0.44	34.09	0.04	125.00
3	11/4/2022	7:30	0.38	39.47	0.04	125.00	11/4/2022	14:30	0.30	50.00	0.04	125.00
4	11/5/2022	9:00	0.32	46.88	0.06	83.33	11/5/2022	16:00	0.48	31.25	0.10	50.00
5	11/6/2022	9:00	0.58	25.86	0.04	125.00	11/6/2022	16:00	0.58	25.86	0.10	50.00
6	11/7/2022	8:00	0.62	24.19	0.06	83.33	11/7/2022	14:30	0.36	41.67	0.08	62.50
7	11/8/2022	8:00	0.44	34.09	0.04	125.00	11/8/2022	14:30	0.24	62.50	0.02	250.00
8	11/9/2022	8:00	0.16	93.75	0.04	125.00	11/9/2022	14:30	0.16	93.75	0.04	125.00
9	11/10/2022	7:30	0.16	93.75	0.02	250.00	11/10/2022	14:30	0.48	31.25	0.02	250.00
10	11/11/2022	7:30	0.40	37.50	0.02	250.00	11/11/2022	14:30	0.66	22.73	0.12	41.67
11	11/12/2022	5:00	0.98	15.31	0.02	250.00	11/12/2022	12:30	0.32	46.88	0.03	166.67
12	11/13/2022	5:00	0.58	25.86	0.03	166.67	11/13/2022	13:00	0.49	30.61	0.04	125.00
13	11/14/2022	7:30	0.52	28.85	0.04	125.00	11/14/2022	14:30	0.52	28.85	0.04	125.00
14	11/15/2022	7:30	0.50	30.00	0.04	125.00	11/15/2022	14:30	0.46	32.61	0.03	166.67
15	11/16/2022	7:30	0.66	22.73	0.04	125.00	11/16/2022	14:30	0.38	39.47	0.04	125.00
16	11/17/2022	7:45	0.22	68.18	0.02	250.00	11/17/2022	14:30	0.48	31.25	0.04	125.00
17	11/18/2022	7:30	0.46	32.61	0.03	166.67	11/18/2022	14:30	0.36	41.67	0.04	125.00
18	11/19/2022	7:30	0.32	46.88	0.04	125.00	11/19/2022	14:30	0.36	41.67	0.06	83.33
19	11/20/2022	7:30	0.42	35.71	0.04	125.00	11/20/2022	14:30	0.52	28.85	0.04	125.00
20	11/21/2022	8:00	0.22	68.18	0.06	83.33	11/21/2022	14:30	0.22	68.18	0.03	166.67
	Specification Max. >150W		≤5.0	≥3.0	≤5.0	≥1.0			≤5.0	≥3.0	≤5.0	≥1.0

	CRT2209071038-001-2		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.18	83.33	0.06	83.33	11/2/2022	14:00	0.16	93.75	0.04	125.00
2	11/3/2022	8:45	0.30	50.00	0.04	125.00	11/3/2022	15:00	0.12	125.00	0.04	125.00
3	11/4/2022	7:30	0.30	50.00	0.05	100.00	11/4/2022	14:30	0.44	34.09	0.04	125.00
4	11/5/2022	9:00	0.75	20.00	0.04	125.00	11/5/2022	16:00	0.96	15.63	0.06	83.33
5	11/6/2022	9:00	0.88	17.05	0.06	83.33	11/6/2022	16:00	0.90	16.67	0.06	83.33
6	11/7/2022	8:00	0.88	17.05	0.06	83.33	11/7/2022	14:30	0.42	35.71	0.06	83.33
7	11/8/2022	8:00	0.46	32.61	0.04	125.00	11/8/2022	14:30	0.54	27.78	0.02	250.00
8	11/9/2022	8:00	0.40	37.50	0.04	125.00	11/9/2022	14:30	0.22	68.18	0.02	250.00
9	11/10/2022	7:30	0.92	16.30	0.02	250.00	11/10/2022	14:30	0.76	19.74	0.02	250.00
10	11/11/2022	7:30	0.66	22.73	0.06	83.33	11/11/2022	14:30	0.98	15.31	0.02	250.00
11	11/12/2022	5:00	0.54	27.78	0.04	125.00	11/12/2022	12:30	0.44	34.09	0.02	250.00
12	11/13/2022	5:00	0.44	34.09	0.04	125.00	11/13/2022	13:00	0.36	41.67	0.04	125.00
13	11/14/2022	7:30	0.44	34.09	0.04	125.00	11/14/2022	14:30	0.52	28.85	0.04	125.00
14	11/15/2022	7:30	0.38	39.47	0.04	125.00	11/15/2022	14:30	0.50	30.00	0.04	125.00
15	11/16/2022	7:30	0.52	28.85	0.04	125.00	11/16/2022	14:30	0.42	35.71	0.04	125.00
16	11/17/2022	7:45	0.22	68.18	0.02	250.00	11/17/2022	14:30	0.56	26.79	0.03	166.67
17	11/18/2022	7:30	0.38	39.47	0.04	125.00	11/18/2022	14:30	0.38	39.47	0.04	125.00
18	11/19/2022	7:30	0.66	22.73	0.04	125.00	11/19/2022	14:30	0.64	23.44	0.04	125.00
19	11/20/2022	7:30	0.46	32.61	0.04	125.00	11/20/2022	14:30	0.52	28.85	0.04	125.00
20	11/21/2022	8:00	0.48	31.25	0.04	125.00	11/21/2022	14:30	0.32	46.88	0.03	166.67
	Specification Max. >150W		≤5.0	≥3.0	≤5.0	≥1.0			≤5.0	≥3.0	≤5.0	≥1.0

	CRT2209071038-001-3		Immediately After Immersion						After Soaking			
			Primary		Secondary				Primary		Secondary	
	Heating Cycle Start		Insulation Resistance		Insulation Resistance		Immersion Start		Insulation Resistance		Insulation Resistance	
Cycle	Date	Time	µA	GΩ	µA	GΩ	Date	Time	µA	GΩ	µA	GΩ
1	11/2/2022	7:30	0.24	62.50	0.06	83.33	11/2/2022	14:00	0.18	83.33	0.04	125.00
2	11/3/2022	8:45	0.24	62.50	0.06	83.33	11/3/2022	15:00	1.10	13.64	0.06	83.33
3	11/4/2022	7:30	0.24	62.50	0.04	125.00	11/4/2022	14:30	1.10	13.64	0.04	125.00
4	11/5/2022	9:00	1.40	10.71	0.06	83.33	11/5/2022	16:00	1.50	10.00	0.06	83.33
5	11/6/2022	9:00	1.60	9.38	0.06	83.33	11/6/2022	16:00	1.50	10.00	0.06	83.33
6	11/7/2022	8:00	1.50	10.00	0.06	83.33	11/7/2022	14:30	1.20	12.50	0.06	83.33
7	11/8/2022	8:00	1.60	9.38	0.04	125.00	11/8/2022	14:30	1.20	12.50	0.06	83.33
8	11/9/2022	8:00	1.10	13.64	0.02	250.00	11/9/2022	14:30	0.80	18.75	0.04	125.00
9	11/10/2022	7:30	1.20	12.50	0.04	125.00	11/10/2022	14:30	1.10	13.64	0.10	50.00
10	11/11/2022	7:30	1.10	13.64	0.14	35.71	11/11/2022	14:30	1.30	11.54	0.13	38.46
11	11/12/2022	5:00	1.20	12.50	0.18	27.78	11/12/2022	12:30	1.40	10.71	0.04	125.00
12	11/13/2022	5:00	1.30	11.54	0.04	125.00	11/13/2022	13:00	1.00	15.00	0.03	166.67
13	11/14/2022	7:30	0.88	17.05	0.04	125.00	11/14/2022	14:30	0.76	19.74	0.04	125.00
14	11/15/2022	7:30	0.64	23.44	0.04	125.00	11/15/2022	14:30	0.88	17.05	0.04	125.00
15	11/16/2022	7:30	0.74	20.27	0.04	125.00	11/16/2022	14:30	0.92	16.30	0.04	125.00
16	11/17/2022	7:45	0.36	41.67	0.02	250.00	11/17/2022	14:30	0.75	20.00	0.04	125.00
17	11/18/2022	7:30	0.66	22.73	0.04	125.00	11/18/2022	14:30	0.80	18.75	0.05	100.00
18	11/19/2022	7:30	0.52	28.85	0.04	125.00	11/19/2022	14:30	0.64	23.44	0.05	100.00
19	11/20/2022	7:30	0.64	23.44	0.03	166.67	11/20/2022	14:30	0.75	20.00	0.04	125.00
20	11/21/2022	8:00	0.98	15.31	0.04	125.00	11/21/2022	14:30	1.10	13.64	0.02	250.00
	Specification Max. >150W		≤5.0	≥3.0	≤5.0	≥1.0			≤5.0	≥3.0	≤5.0	≥1.0

Complies: YES NO

Tested By:	S. Hammond			Signature or initials:	SH
Engineer:	Greg Trykowski			Signature or initials:	GT
Reviewed By:	cwm			Signature or initials:	cwm
Equipment Used:	15,16,17			Sample No:	CRT2209071038-001-(1-3)
Amb (ºC):	15 to 25	RH%	25 to 75	Completion Date:	11/22/2022

Temperature Rise

The temperature rise of the sample transformers must be determined by the resistance method

The transformer temperature rise must be kept at least 9 degrees F (5 degrees C) below the maximum continuous duty temperature of the most critical insulating materials used

Transformers must be tested under (1) Rated Load, (2) Short Circuit (3) Open Circuit

IEEE Standard C57.12.91, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers, Section 11, Temperature Test, for temperature rise formulas and guidance in the determination of transformer temperature rise

$$Tr = R1/Ro\ (Tk + To) - (Tk + Ta), \text{ where}$$

Tr - Temperature rise
Ro - Cold resistance of a coil, Ohms
To - Ambient temperature corresponding to the cold resistance, Ro
R1 - Hot resistance of a coil, Ohms
Tk - 234.5°C for copper
Ta - Ambient temperature corresponding to the hot resistance, R1

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz

Maximum continuous duty temperature of the most critical insulating material.		
Material	Temperature	
Garware EM6 - polyester film	130	˚C

		Rated Load		Short Circuit		Open Circuit		
Sample	Parameter	Primary	Secondary	Primary	Secondary	Primary	Secondary	Pass / Fail
	Ro (mΩ)	32.5	53.8	32.5	53.8	32.5	53.8	
	R1 (mΩ)	43.6	57.1	43.4	57.8	43.9	57.9	Pass
	Tr (˚C)	84.9	13.5	83.4	16.9	87.1	17.1	
	Ro (mΩ)	36.8	55.8	36.8	55.8	36.8	55.8	
	R1 (mΩ)	45.8	62.0	47.1	60.5	46.2	60.2	Pass
	Tr (˚C)	60.0	26.2	69.1	19.7	62.8	18.2	
	Ro (mΩ)	38.6	50.8	38.6	50.8	38.6	50.8	
	R1 (mΩ)	45.6	59.5	44.1	59.9	43.1	50.8	Pass
	Tr (˚C)	43.9	41.6	34.2	43.6	27.9	51.0	

Calculated Maximum Internal Operating Temperature @ 65˚C Ambient						
	Rated Load		Short Circuit		Open Circuit	
Sample	Primary	Secondary	Primary	Secondary	Primary	Secondary
	150	78.5	148	81.9	152.1	82.1
	125.0	91.2	134.1	84.7	127.8	83.2
	108.9	106.6	99.2	108.6	92.9	116.0

IEEE Std C57.12.01-2005 (Table 10)		
Limits of temp. rise for continuously rated dry-type transformer winding		
Insulation system temp. class (°C)	Winding hottest-spot temp. rise (°C)	Average winding-temperature rise by resistance (°C)
130	90	75
150	110	90
180	140	115
200	160	130
220	180	150

Complies:	✓	YES		NO

Tested By:	S. Hammond		Signature or initials:		Comp. Date	10/26/22
Engineer:	Greg Trykowski		Signature or initials:			
Reviewed By:	cwm		Signature or initials:			
Test Equipment Used:	6,7,9,12,16		Sample No:	CRT2209071038-001-(4-6)		
Amb (ºC):	21.5	RH% 65				

Temperature Rise

The temperature rise of the sample transformers must be determined by the resistance method

The transformer temperature rise must be kept at least 9 degrees F (5 degrees C) below the maximum continuous duty temperature of the most critical insulating materials used

Transformers must be tested under (1) Rated Load, (2) Short Circuit (3) Open Circuit

IEEE Standard C57.12.91, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers, Section 11, Temperature Test, for temperature rise formulas and guidance in the determination of transformer temperature rise

$$Tr = R1/Ro\ (Tk + To) - (Tk + Ta), \text{ where}$$

Tr - Temperature rise
Ro - Cold resistance of a coil, Ohms
To - Ambient temperature corresponding to the cold resistance, Ro
R1 - Hot resistance of a coil, Ohms
Tk - 234.5°C for copper
Ta - Ambient temperature corresponding to the hot resistance, R1

Results 10/15W

Type	Wattage		Primary		Secondary		Frequency	
L-830-16	10/15	Watts	6.6	Amps	6.6	Amps	60	Hertz

Maximum continuous duty temperature of the most critical insulating material.		
Material	Temperature	
Garware EM6 - polyester film	130	˚C

		Rated Load		Short Circuit		Open Circuit		
Sample	Parameter	Primary	Secondary	Primary	Secondary	Primary	Secondary	Pass / Fail
-001-001	Ro (mΩ)	49.1	70.5	49.1	70.5	49.1	70.5	
	R1 (mΩ)	56.7	73.3	58.2	74.6	54.7	74.0	Pass
	Tr (˚C)	36.5	7.1	44.4	11.9	25.1	8.7	
-001-002	Ro (mΩ)	54.8	71.5	54.8	71.5	54.8	71.5	
	R1 (mΩ)	59.2	75.0	59.1	74.0	61.2	78.5	Pass
	Tr (˚C)	17.5	9.5	17.0	5.9	25.8	21.0	
-001-003	Ro (mΩ)	54.9	75.1	54.9	75.1	54.9	75.1	
	R1 (mΩ)	57.4	79.9	57.4	79.6	59.3	75.1	Pass
	Tr (˚C)	7.6	12.3	8.6	12.3	17.5	16.7	

Calculated Maximum Internal Operating Temperature @ 65˚C Ambient						
	Rated Load		Short Circuit		Open Circuit	
Sample	Primary	Secondary	Primary	Secondary	Primary	Secondary
-001-001	102	72.1	109	76.9	90.1	73.7
-001-002	82.5	74.5	82.0	70.9	90.8	86.0
-001-003	72.6	77.3	73.6	77.3	82.5	81.7

IEEE Std C57.12.01-2005 (Table 10)		
Limits of temp. rise for continuously rated dry-type transformer winding		
Insulation system temp. class (°C)	Winding hottest-spot temp. rise (°C)	Average winding-temperature rise by resistance (°C)
130	90	75
150	110	90
180	140	115
200	160	130
220	180	150

Complies:	✓	YES		NO

Tested By:	S. Hammond		Signature or initials:		Comp. Date	6/18/22
Engineer:	Rudy Sporman		Signature or initials:	RS		
Reviewed By:	cwm		Signature or initials:	cwm		
Test Equipment Used:	3,7,8,9		Sample No:	CRT2206301329-001-001 thru -003		
Amb (ºC):	22.5	RH% 67				

Temperature Rise

The temperature rise of the sample transformers must be determined by the resistance method

The transformer temperature rise must be kept at least 9 degrees F (5 degrees C) below the maximum continuous duty temperature of the most critical insulating materials used

Transformers must be tested under (1) Rated Load, (2) Short Circuit (3) Open Circuit

IEEE Standard C57.12.91, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers, Section 11, Temperature Test, for temperature rise formulas and guidance in the determination of transformer temperature rise

$$Tr = R1/Ro\ (Tk + To) - (Tk + Ta), \text{ where}$$

Tr - Temperature rise
Ro - Cold resistance of a coil, Ohms
To - Ambient temperature corresponding to the cold resistance, Ro
R1 - Hot resistance of a coil, Ohms
Tk - 234.5°C for copper
Ta - Ambient temperature corresponding to the hot resistance, R1

Results

Type	Wattage		Primary		Secondary		Frequency	
L-830-4	100	Watts	6.6	Amps	6.6	Amps	60	Hertz

Maximum continuous duty temperature of the most critical insulating material.		
Material	Temperature	
Garware EM6 - polyester film	130	˚C

		Rated Load		Short Circuit		Open Circuit		
Sample	Parameter	Primary	Secondary	Primary	Secondary	Primary	Secondary	Pass / Fail
-001-004	Ro (mΩ)	114.6	129.4	114.6	129.4	114.6	129.4	
	R1 (mΩ)	116.3	139.3	131.4	139.7	124.8	149.6	Pass
	Tr (˚C)	0.8	16.5	34.5	17.3	18.7	35.9	
-001-005	Ro (mΩ)	116.9	129.7	116.9	129.7	116.9	129.7	
	R1 (mΩ)	119.4	146.5	126.0	144.2	125.6	146.1	Pass
	Tr (˚C)	1.5	29.1	16.9	25.6	16.0	29.3	
-001-006	Ro (mΩ)	104.7	130.2	104.7	130.2	104.7	130.2	
	R1 (mΩ)	119.7	142.7	116.3	145.5	119.1	130.2	Pass
	Tr (˚C)	33.6	21.5	24.3	26.0	32.1	29.2	

Calculated Maximum Internal Operating Temperature @ 65˚C Ambient						
	Rated Load		Short Circuit		Open Circuit	
Sample	Primary	Secondary	Primary	Secondary	Primary	Secondary
-001-004	65.8	81.5	99.5	82.3	83.7	101
-001-005	66.5	94.1	81.9	90.6	81.0	94.3
-001-006	98.6	86.5	89.3	91.0	97.1	94.2

IEEE Std C57.12.01-2005 (Table 10)		
Limits of temp. rise for continuously rated dry-type transformer winding		
Insulation system temp. class (°C)	Winding hottest-spot temp. rise (°C)	Average winding-temperature eise by resistance (°C)
130	90	75
150	110	90
180	140	115
200	160	130
220	180	150

Complies:	✓	YES		NO

Tested By:	S. Hammond		Signature or initials:	S-H	Comp. Date	7/18/22
Engineer:	Rudy Sporman		Signature or initials:	RS		
Reviewed By:	cwm		Signature or initials:	cwm		
Test Equipment Used:	3,7,8,9		Sample No:	CRT2206301329-001-004 thru -006		
Amb (ºC):	22.5	RH%	67			

Temperature Rise

The temperature rise of the sample transformers must be determined by the resistance method

The transformer temperature rise must be kept at least 9 degrees F (5 degrees C) below the maximum continuous duty temperature of the most critical insulating materials used

Transformers must be tested under (1) Rated Load, (2) Short Circuit (3) Open Circuit

IEEE Standard C57.12.91, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers, Section 11, Temperature Test, for temperature rise formulas and guidance in the determination of transformer temperature rise

$$Tr = R1/Ro\ (Tk + To) - (Tk + Ta)$$, where

Tr - Temperature rise
Ro - Cold resistance of a coil, Ohms
To - Ambient temperature corresponding to the cold resistance, Ro
R1 - Hot resistance of a coil, Ohms
Tk - 234.5°C for copper
Ta - Ambient temperature corresponding to the hot resistance, R1

Results

Type	Wattage		Primary		Secondary		Frequency	
L-830-18	150	Watts	6.6	Amps	6.6	Amps	60	Hertz

Maximum continuous duty temperature of the most critical insulating material.		
Material	Temperature	
Garware EM6 - polyester film	130	˚C

		Rated Load		Short Circuit		Open Circuit		
Sample	Parameter	Primary	Secondary	Primary	Secondary	Primary	Secondary	Pass / Fail
-002-001	Ro (mΩ)	120.4	151.5	120.4	151.5	120.4	151.5	Pass
	R1 (mΩ)	158.1	163.9	156.2	168.8	162.9	169.4	
	Tr (˚C)	74.8	15.5	70.8	23.8	85.0	24.8	
-002-002	Ro (mΩ)	121.7	146.7	121.7	146.7	121.7	146.7	Pass
	R1 (mΩ)	170.2	158.1	152.8	159.0	152.0	162.3	
	Tr (˚C)	96.7	14.4	60.0	16.0	58.4	21.8	
-002-003	Ro (mΩ)	120.3	149.1	120.3	149.1	120.3	149.1	Pass
	R1 (mΩ)	166.4	159.7	151.2	156.0	150.2	149.1	
	Tr (˚C)	92.8	12.7	60.4	6.4	58.3	8.6	

Calculated Maximum Internal Operating Temperature @ 65˚C Ambient						
	Rated Load		Short Circuit		Open Circuit	
Sample	Primary	Secondary	Primary	Secondary	Primary	Secondary
-002-001	139.8	80.5	135.8	88.8	150.0	89.8
-002-002	161.7	79.4	125.0	81.0	123.4	86.8
-002-003	157.8	77.7	125.4	71.4	123.3	73.6

IEEE Std C57.12.01-2005 (Table 10)		
Limits of temp. rise for continuously rated dry-type transformer winding		
Insulation system temp. class (°C)	Winding hottest-spot temp. rise (°C)	Average winding-temperature rise by resistance (°C)
130	90	75
150	110	90
180	140	115
200	160	130
220	180	150

Complies: ☑ YES ☐ NO

Tested By:	S. Hammond	Signature or initials:	S+h	Comp. Date	7/20/22
Reviewed By:	Rudy Sporman, cwm	Signature or initials:	RS		
Test Equipment Used:	3,7,8,9	Sample No:	CRT2206301329-002-001 thru -003		
Amb (ºC):	22	RH%:	50		

Temperature Rise

The temperature rise of the sample transformers must be determined by the resistance method

The transformer temperature rise must be kept at least 9 degrees F (5 degrees C) below the maximum continuous duty temperature of the most critical insulating materials used

Transformers must be tested under (1) Rated Load, (2) Short Circuit (3) Open Circuit

IEEE Standard C57.12.91, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers, Section 11, Temperature Test, for temperature rise formulas and guidance in the determination of transformer temperature rise

Tr = R1/Ro (Tk + To) – (Tk + Ta), where

Tr - Temperature rise
Ro - Cold resistance of a coil, Ohms
To - Ambient temperature corresponding to the cold resistance, Ro
R1 - Hot resistance of a coil, Ohms
Tk - 234.5°C for copper
Ta - Ambient temperature corresponding to the hot resistance, R1

Results

Type	Wattage		Primary		Secondary		Frequency	
L-830-6	200	Watts	6.6	Amps	6.6	Amps	60	Hertz

Maximum continuous duty temperature of the most critical insulating material.		
Material	Temperature	
Garware EM6 - polyester film	130	˚C

		Rated Load		Short Circuit		Open Circuit		
Sample	Parameter	Primary	Secondary	Primary	Secondary	Primary	Secondary	Pass / Fail
	Ro (mΩ)	109.1	141.7	109.1	141.7	109.1	141.7	
	R1 (mΩ)	133.6	152.0	129.3	148.1	143.6	155.3	Pass
	Tr (˚C)	55.2	16.5	45.2	9.4	78.4	22.3	
	Ro (mΩ)	108.6	134.8	108.6	134.8	108.6	134.8	
	R1 (mΩ)	122.7	138.7	126.0	141.2	123.0	139.1	Pass
	Tr (˚C)	31.0	5.4	38.8	10.0	31.8	6.1	
	Ro (mΩ)	105.8	133.7	105.8	133.7	105.8	133.7	
	R1 (mΩ)	124.6	139.0	123.5	138.8	120.4	133.7	Pass
	Tr (˚C)	43.1	8.1	40.6	7.7	33.0	6.2	

Calculated Maximum Internal Operating Temperature @ 65˚C Ambient						
	Rated Load		Short Circuit		Open Circuit	
Sample	Primary	Secondary	Primary	Secondary	Primary	Secondary
	120.2	81.5	110.2	74.4	143.4	87.3
	96.0	70.4	103.8	75.0	96.8	71.1
	108.1	73.1	105.6	72.7	98.0	71.2

IEEE Std C57.12.01-2005 (Table 10)		
Limits of temp. rise for continuously rated dry-type transformer winding		
Insulation system temp. class (°C)	Winding hottest-spot temp. rise (°C)	Average winding-temperature eise by resistance (°C)
130	90	75
150	110	90
180	140	115
200	160	130
220	180	150

Complies:	✓	YES		NO

Tested By:	S. Hammond		Signature or initials:		Comp. Date	10/26/22
Engineer:	Greg Trykowski		Signature or initials:			
Reviewed By:	cwm		Signature or initials:			
Test Equipment Used:	6,7,9,12,16		Sample No:	CRT2209071038-001-(1-3)		
Amb (ºC):	21.5	RH% 65				

Equipment list				
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	N1441	Measuring Tape	Stanley Fatmax	07-Jul-2024
2	N1344	Caliper	Brown & Sharpe	01-Jul-2023
3	T1433	Data Logger, T & H	Omega Engineering, Inc.	6-Aug-22
4	L234	Power Meter, Digital	Yokogawa Corporation	3-Jan-23
5	A200	CT	Pearson Electronics	20-May-23
6	A208	CT	Pearson Electronics	20-May-23
7	L224	IR thermometer	Fluke	13-Oct-22
8	M312	Stopwatch	Control Company	31-Mar-23
9	O772	DLRO	Megger	17-May-2023
10	A213	CT	Pearson Electronics	22-Jun-24
11	A205	CT	Pearson Electronics	19-Feb-24
12	M308	Stopwatch	Control Company	24-Jan-23
13	T1434	Data Logger, T & H	Omega Engineering, Inc.	16-Jun-23
14	M225	Multimeter, Digital	Fluke Corporation	13-Apr-23
15	E431	Portable DC Test Set	VLF Hipot Instruments	10-Aug-23
16	M312	Stopwatch	Control Company	31-Mar-23
17	T1430	Data Logger, T & H	Omega Engineering, Inc.	17-Jun-23
18	N797	Durometer	Fowler	05-Jul-2023
19				
20				
Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files				