MKII Positive Lock* Dual and Single Crimp Terminals

1. INTRODUCTION

1.1 Purpose

Qualification Testing was performed on the new 2-wire and existing 1-wire Positive Lock MKII 187 and 250 Receptacles using brass on tin combinations to determine its conformance to the requirements of Product Specifications 108-5126 Rev AG and 108-5127 Rev S.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the 2-wire and 1-wire MKII 187 and 250 series terminals using a brass on tin combination. Testing was performed at the Harrisburg Electrical Components Test Laboratory between December 12, 2022 and February 22, 2023. Documentation is on file and maintained at the Harrisburg Electrical Components Test Laboratory under EA20220112T and EA20220431T.

1.3 Conclusion

All specimens listed in paragraph 1.5 conformed to the requirements of the specifications.

1.4 Product Description

TE Connectivity 187 and 250 Series Positive Lock MK-II connectors are specifically designed to provide ease of assembly and secure retention to mating tabs. These unique features are attainable by the reduced insertion force of the product and the locking dimple. The receptacle locks onto mating tabs containing holes and is removable only by deflecting an integrally designed depressor prior to unmating. The depressor can be deflected manually by thumb pressure or automatically by a cam inside a specifically designed housing. Receptacles can be used with or without a housing. Product is designed to mate with 187 x 032 and 250 x 032 tabs with holes of size and location according to Product Specifications 108-5126 and 108-5127. They are also designed to be terminated to a variety of wire sizes and combinations according to Application Specifications 114-5041 and 114-5042.

1.5 Test Specimens

The test specimens were representative of normal production lots, and the following part numbers were used for testing:

Table 1 – Test Specimens

Test Set	Quantity	Part Number	Description
1	10	2238279-1 rev 9	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (2) 22 AWG stranded lead wires
2	10	2238279-1 rev 9	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (2) 20 AWG stranded lead wires
3	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 18 AWG stranded lead wires
4	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG + (1) 20 AWG stranded lead wires
5	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG + (1) 16 AWG stranded lead wires
6	10	2238283-1 rev 7	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 22 AWG stranded lead wires
7	10	2238283-1 rev 7	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires

Table 1 – Test Specimens *(continued)*

Test Set	Quantity	Part Number	Description
8	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires
9	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG + (1) 16 AWG stranded lead wires
10	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG + (1) 18 AWG stranded lead wires
11	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 20 AWG stranded lead wire
12	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 16 AWG stranded lead wire
13	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire
14	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires
15	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 22 AWG stranded lead wire
16	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wires
17	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires
18	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wires
19	10	2238279-1 rev 9 1969870-1 rev A	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (2) 20 AWG stranded lead wires loaded into housing
20	10	2238278-1 rev 8 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 18 AWG stranded lead wires loaded into housing
21	10	2238283-1 rev 7 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires loaded into housing
22	10	2238285-1 rev 9 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires loaded into housing
23	10	63498-1 rev M 1969870-1 rev A	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 16 AWG stranded lead wire loaded into housing
24	10	2238155-2 rev B 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wire loaded into housing
25	10	2238156-2 rev A 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire loaded into housing

Table 1 – Test Specimens *(continued)*

Test Set	Quantity	Part Number	Description
26	10	170329-1 rev W 1969870-1 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wire loaded into housing
27	10	2238279-1 rev 9	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (2) 20 AWG stranded lead wires
28	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 18 AWG stranded lead wires
29	10	2238283-1 rev 7	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires
30	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires
31	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 16 AWG stranded lead wire
32	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wire
33	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire
34	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wire
35	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG + (1) 16 AWG stranded lead wires = 2.0 mm2 or (1) 14 AWG @ 15A
36	10	2238283-1 rev 7	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires = 1.0mm2 or (1) 17 AWG @ 9.5 A
37	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires = 3.9mm2 or (1) 11 AWG @ 22.5 A
38	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG + (1) 18 AWG stranded lead wires = 2.7 mm2 or (1) 13 AWG @ 17.5 A
39	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 20 AWG stranded lead wire @ 5 A
40	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 16 AWG stranded lead wire @ 12 A
41	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire @ 7 A
42	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires @ 15 A
43	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 22 AWG stranded lead wire @ 3 A
44	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wires @ 7 A
45	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires @ 15 A
46	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wires @ 25 A
47	10	2238279-1 rev 9 2238278-1 rev 8 1969870-1 rev A	Receptacle, Positive Lock MKII, 187 & 250 Series: Crimped onto (2) 20 AWG stranded lead wires loaded into housing

Table 1 – Test Specimens *(continued)*

Test Set	Quantity	Part Number	Description
48	10	2238278-1 rev 8 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 18 AWG stranded lead wires loaded into housing
49	10	2238283-1 rev 7 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires loaded into housing
50	10	2238285-1 rev 9 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires loaded into housing
51	10	63498-1 rev M 2238278-1 rev 8 1969870-1 rev A	Receptacle, Positive Lock MKII, 187 & 250 Series: Crimped onto (2) 20 AWG stranded lead wires loaded into housing
52	10	2238155-2 rev B 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wire loaded into housing
53	10	2238156-2 rev A 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire loaded into housing
54	10	170329-1 rev W 1969761-1 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wire loaded into housing
55	10	2238279-1 rev 9	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (2) 20 AWG stranded lead wires
56	10	2238278-1 rev 8	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG + (1) 16 AWG stranded lead wires
57	10	2238283-1 rev 7	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 20 AWG stranded lead wires
58	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (2) 14 AWG stranded lead wires
59	10	2238285-1 rev 9	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG + (1) 18 AWG stranded lead wires
60	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 20 AWG stranded lead wire
61	10	63498-1 rev M	Receptacle, Positive Lock MKII, 187 Series: Crimped onto (1) 16 AWG stranded lead wire
62	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wire
63	10	2238155-2 rev B	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires
64	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 22 AWG stranded lead wire

Table 1 – Test Specimens *(continued)*

Test Set	Quantity	Part Number	Description
65	10	2238156-2 rev A	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 18 AWG stranded lead wires
66	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 14 AWG stranded lead wires
67	10	170329-1 rev W	Receptacle, Positive Lock MKII, 250 Series: Crimped onto (1) 10 AWG stranded lead wires

Note: *Plated test tabs were used with unplated receptacles and unplated test tabs used with plated receptacles.*

1.6 Qualification Test Sequence

The specimens in Table 1 were subjected to the testing outlined in Table 2.

Table 2 – Specimens Test Sequence

Test or Examination	Test Set					
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15 16, 17, 18	19, 20, 21, 22, 23, 24, 25, 26	27, 28, 29, 30, 31, 32, 33, 34	35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46	47, 48, 49, 50, 51, 52, 53, 54	55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67
	Test Sequence *(a)*					
Visual Examination	1	1	1	1	1	1
Crimp Tensile Strength	2					
Contact Retention Force		2				
Contact Locking Strength			2			11
Temperature Rise				2		
Connector Mating Force					2	
Connector Unmating Force					3	
Insulation Resistance					4, 7	
Dielectric Withstanding Voltage					5, 8	
Vibration						3
Humidity Steady State					6	5
Thermal Shock						7
Salt Spray						9
Termination Resistance						2, 4, 6, 8, 10

Note: *(a) Numbers indicate sequence in which tests were performed.*

1.7 Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature:	15°C to 35°C
Relative Humidity	20% to 80%

2. SUMMARY OF TESTING

2.1 Visual Examination

Where specified, specimens were visually examined and no evidence of physical damage detrimental to performance was observed.

2.2 Crimp Tensile Strength

All 187 Series specimens conformed to the minimum force requirements. See Table 3 for Results.

All 250 Series specimens conformed to the minimum force requirements. See Table 4 for Results.

Table 3 - Positive Lock MKII, 187 Series Crimp Tensile Strength (N)

	Test Set 1	Test Set 2	Test Set 11	Test Set 12
Specimen Description	**(2) 22 AWG**	**(2) 20 AWG**	**(1) 20 AWG**	**(1) 16 AWG**
Minimum Requirement	**49N**	**78.4N**	**78.4N**	**205.8N**
Minimum	58.85	107.11	113.91	279.64
Maximum	90.91	122.41	126.76	311.61
Mean	75.14	112.89	120.27	294.86
Count	10	10	10	10

Table 4 – Positive Lock MKII, 250 Series Crimp Tensile Strength (N)

	Test Set 3	Test Set 4		Test Set 5		Test Set 6
Specimen Description	**(2) 18 AWG**	**(1) 18 AWG**	**(1) 20 AWG**	**(1) 18 AWG**	**(1) 16 AWG**	**(2) 22 AWG**
Minimum Requirement	**117.6N**	**117.6N**	**78.4N**	**117.6N**	**205.8N**	**49N**
Minimum	138.19	156.6	104.98	158.92	296.67	82.62
Maximum	197.94	185.07	127.68	188.08	344.8	88.07
Mean	171.61	169.531	116.32	172.07	326.34	85.73
Count	10	10	10	10	10	10

Table 4 – Positive Lock MKII, 250 Series Crimp Tensile Strength (N) *(continued)*

	Test Set 7	Test Set 8	Test Set 9		Test Set 10	
Specimen Description	**(2) 20 AWG**	**(2) 14 AWG**	**(1) 14 AWG**	**(1) 16 AWG**	**(1) 14 AWG**	**(1) 18 AWG**
Minimum Requirement	**78.4N**	**313.6N**	**313.6N**	**205.8**	**313.6N**	**117.6N**
Minimum	122.83	328.92	375.36	310.03	340.02	176.91
Maximum	126.99	413.45	413.95	338.92	414.7	201.05
Mean	125.26	368.80	392.66	327.39	380.80	190.76
Count	10	10	10	10	10	10

	Test Set 13	Test Set 14	Test Set 15	Test Set 16	Test Set 17	Test Set 18
Specimen Description	**(1) 18 AWG**	**(1) 14 AWG**	**(1) 22 AWG**	**(1) 18 AWG**	**(1) 14 AWG**	**(1) 10 AWG**
Minimum Requirement	**117.6N**	**313.6N**	**49N**	**117.6N**	**313.6N**	**490N**
Minimum	173.03	403.57	58.92	188.54	388.46	503.71
Maximum	194.35	442.56	87.46	202.65	446.10	553.06
Mean	182.90	419.11	76.72	199.23	415.33	531.04
Count	10	10	10	10	10	10

2.3 Contact Retention Force

All 187 Series specimens conformed to the minimum force requirements. See Table 5 for Results.

All 250 Series specimens conformed to the minimum force requirements. See Table 6 for Results.

Table 5 - Positive Lock MKII, 187 Series Contact Retention Force (N)

	Test Set 19	Test Set 23
Specimen Description	**(2) 20 AWG**	**(1) 16 AWG**
Minimum Requirement	**49N**	**49N**
Minimum	69.27	58.79
Maximum	79.10	74.61
Mean	74.11	65.37
Count	10	10

Table 6 – Positive Lock MKII, 250 Series Contact Retention Force (N)

	Test Set 20	Test Set 21	Test Set 22	Test Set 24	Test Set 25	Test Set 26
Specimen Description	**(2) 18 AWG**	**(2) 20 AWG**	**(2) 14 AWG**	**(1) 14 AWG**	**(1) 18 AWG**	**(1) 10 AWG**
Minimum Requirement	**57.8N**	**57.8N**	**57.8N**	**57.8N**	**57.8N**	**57.8N**
Minimum	89.84	72.98	60.59	57.99	62.86	86.32
Maximum	96.13	94.96	98.09	91.80	99.23	112.28
Mean	92.76	90.77	86.98	72.78	93.07	100.35
Count	10	10	10	10	10	10

2.4 Contact Locking Strength

TS 27 through 34

All 187 Series specimens conformed to the minimum force requirements. See Table 7 for Results.

All 250 Series specimens conformed to the minimum force requirements. See Table 8 for Results.

TS 55 through 67

All 187 Series specimens exceeded the 49 N Final requirement. See Table 9 for results

All 250 Series specimens exceeded the 68.6 N Final requirement. See Table 10 for results.

Table 7 - Positive Lock MKII, 187 Series Contact Locking Strength (N)

	Test Set 27	Test Set 31
Specimen Description	**(2) 20 AWG**	**(1) 16 AWG**
Minimum Requirement	**58.8N**	**58.8N**
Minimum	89.28	85.44
Maximum	97.37	104.68
Mean	92.92	93.93
Count	10	10

Table 8 – Positive Lock MKII, 250 Series Contact Locking Strength (N)

	Test Set 28	Test Set 29	Test Set 30	Test Set 32	Test Set 33	Test Set 34
Specimen Description	**(2) 18 AWG**	**(2) 20 AWG**	**(2) 14 AWG**	**(1) 14 AWG**	**(1) 18 AWG**	**(1) 10 AWG**
Minimum Requirement	**78.4N**	**78.4N**	**78.4N**	**78.4N**	**78.4N**	**78.4N**
Minimum	192.94	187.18	159.37	166.45	164.73	159.31
Maximum	207.43	203.54	193.52	191.57	203.07	190.98
Mean	198.74	194.09	173.72	175.27	190.10	169.20
Count	10	10	10	10	10	10

Table 9 – Positive Lock MKII, 187 Series Contact Locking Strength (N)

	Test Set 55	Test Set 60	Test Set 61
Specimen Description	**(2) 20 AWG**	**(1) 20 AWG**	**(1) 16 AWG**
Minimum Requirement	**49N**	**49N**	**49N**
Minimum	89.28	92.22	112.46
Maximum	97.37	122.35	128.09
Mean	92.92	107.71	117.65
Count	10	10	9*

*TS 61 Specimen was removed from testing due to locking tab not being engaged.

Table 10 – Positive Lock MKII, 250 Series Contact Locking Strength (N)

	Test Set 56	Test Set 57	Test Set 58	Test Set 59	Test Set 62	Test Set 63	Test Set 64	Test Set 65	Test Set 66	Test Set 67
Specimen Description	**(1) 18 AWG (1) 16 AWG**	**(2) 20 AWG**	**(2) 14 AWG**	**(1) 14 AWG (1) 18 AWG**	**(1) 18 AWG**	**(1) 14 AWG**	**(1) 22 AWG**	**(1) 18 AWG**	**(1) 14 AWG**	**(1) 10 AWG**
Minimum Requirement	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**	**68.6N**
Minimum	202.09	201.58	171.41	162.68	169.22	161.91	73.97	185.89	142.09	152.07
Maximum	217.69	230.75	211.66	196.25	194.32	211.14	92.04	204.76	193.31	189.87
Mean	209.82	213.06	189.62	173.88	181.83	197.62	85.61	198.02	176.69	171.34
Count	10	10	10	10	10	10	10	10	10	10

2.5 Temperature Rise

All specimens passed testing with temperature rises less than 30°C above ambient. See Table 11 for summary of 187 series results. See Table 12 for summary of 250 series results.

Table 11 - Positive Lock MKII, 187 Series Temperature Rise (°C)

	Test Set 39	Test Set 40
Specimen Description	**(1) 20 AWG**	**(1) 16 AWG**
Test Current	**5 A**	**12 A**
Minimum	4.77	13.58
Maximum	5.32	14.38
Mean	5.05	14.07
Count	10	10

Table 12 – Positive Lock MKII, 250 Series Temperature Rise (°C)

	Test Set 35	Test Set 36	Test Set 37	Test Set 38	Test Set 41	Test Set 42	Test Set 43	Test Set 44	Test Set 45	Test Set 46
Specimen Description	(1) 18 AWG (1) 16 AWG	(2) 20 AWG	(2) 14 AWG	(1) 14 AWG (1) 18 AWG	(1) 18 AWG	(1) 14 AWG	(1) 22 AWG	(1) 18 AWG	(1) 14 AWG	(1) 10 AWG
Test Current	15 A	9.5 A	21.75 A	17.5 A	7 A	15 A	3 A	7 A	15 A	25 A
Minimum	14.98	9.82	20.61	15.72	6.25	15.38	2.22	6.46	14.14	21.11
Maximum	16.03	11.35	22.04	17.43	7.43	17.10	3.01	7.44	15.29	22.25
Mean	15.41	10.47	21.13	16.62	6.81	16.21	2.59	6.90	14.73	21.68
Count	10	10	10	10	10	10	10	10	10	10

2.6 Connector Mating Force

All 187 Series specimens conformed to the maximum force requirements. See Table 13 for Results.
All 250 Series specimens conformed to the maximum force requirements. See Table 14 for Results.

Table 13 - Positive Lock MKII, 187 Series Connector Mating Force (N)

	Test Set 47	Test Set 51
Specimen Description	(2) 20 AWG	(1) 16 AWG
Maximum Requirement	44.6N	44.6N
Minimum	16.44	25.24
Maximum	24.25	36.97
Mean	21.18	31.54
Count	10	10

Note: *Only187 size positions were tested in the hybrid connector.*

Table 14 – Positive Lock MKII, 250 Series Connector Mating Force (N)

	Test Set 48	Test Set 49	Test Set 50	Test Set 52	Test Set 53	Test Set 54
Specimen Description	(2) 18 AWG	(2) 20 AWG	(2) 14 AWG	(1) 14 AWG	(1) 18 AWG	(1) 10 AWG
Maximum Requirement	34.3N	34.3N	34.3N	34.3N	34.3N	34.3N
Minimum	18.59	15.80	8.60	19.23	19.66	21.92
Maximum	30.41	27.47	14.38	28.19	32.74	28.63
Mean	25.07	19.60	11.62	22.93	27.90	25.04
Count	10	10	10	10	10	10

2.7 Connector Unmating Force

All 187 Series specimens conformed to the minimum force requirements. See Table 15 for Results.

All 250 Series specimens conformed to the minimum force requirements. See Table 16 for Results.

Table 15 - Positive Lock MKII, 187 Series Connector Unmating Force (N)

	Test Set 47	Test Set 51
Specimen Description	**(2) 20 AWG**	**(1) 16 AWG**
Minimum Requirement	**5.88N**	**5.88N**
Minimum	13.79	20.93
Maximum	17.60	31.89
Mean	15.81	24.96
Count	10	10

Table 16 – Positive Lock MKII, 250 Series Connector Unmating Force (N)

	Test Set 48	Test Set 49	Test Set 50	Test Set 52	Test Set 53	Test Set 54
Specimen Description	**(2) 18 AWG**	**(2) 20 AWG**	**(2) 14 AWG**	**(1) 14 AWG**	**(1) 18 AWG**	**(1) 10 AWG**
Minimum Requirement	**5.88N**	**5.88N**	**5.88N**	**5.88N**	**5.88N**	**5.88N**
Minimum	12.27	12.98	6.47	12.54	14.57	20.24
Maximum	15.07	15.86	10.03	15.88	21.24	23.68
Mean	13.68	14.85	8.71	13.87	17.27	21.85
Count	10	10	10	10	10	10

2.8 Insulation Resistance

All specimens met the initial minimum 1000 megaohm and final minimum 100 megaohm minimum requirements.

2.9 Dielectric Withstanding Voltage

With a 2000-volt AC potential applied between adjacent contacts of mated specimens for one minute, none of the specimen's exhibited breakdown or flashover.

2.10 Humidity Steady State

Specimens showed no signs of damage that would be detrimental to product performance.

2.11 Termination Resistance

All specimens conformed to the requirements. See Table 17 for 187 series results. See Table 18 for 250 series results.

Table 17 - Positive Lock MKII, 187 Series Termination Resistance (mΩ)

	Test Set 55				
Specimen Description	**(2) 20 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.809	0.800	0.847	0.889	0.820
Maximum	1.045	0.939	1.076	1.175	1.771
Mean	0.886	0.852	0.942	0.991	1.031
Count	10	10	10	10	10

	Test Set 60				
Specimen Description	**(1) 20 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.750	0.792	0.790	0.872	0.876
Maximum	0.786	0.961	1.112	1.344	1.091
Mean	0.767	0.857	0.904	1.035	0.947
Count	10	10	10	10	10

	Test Set 61				
Specimen Description	**(1) 16 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.639	0.691	0.691	0.716	0.713
Maximum	0.685	0.815	1.102	1.086	0.791
Mean	0.662	0.727	0.768	0.798	0.765
Count	10	10	10	10	10

Table 18 - Positive Lock MKII, 250 Series Termination Resistance (mΩ)

	Test Set 56				
Specimen Description	**(1) 18 AWG & (1) 16 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.819	0.741	0.819	0.849	0.663
Maximum	1.220	0.917	1.371	1.392	0.817
Mean	1.023	0.833	0.996	1.065	0.731
Count	10	10	10	10	10
	Test Set 57				
Specimen Description	**(2) 20 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.956	0.813	0.930	0.965	0.712
Maximum	1.085	1.161	1.446	1.538	1.035
Mean	1.033	1.001	1.231	1.313	0.949
Count	10	10	10	10	10
	Test Set 58				
Specimen Description	**(2) 14 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	1.033	1.052	1.054	1.084	1.064
Maximum	1.155	1.162	1.178	1.223	1.121
Mean	1.098	1.089	1.098	1.127	1.099
Count	10	10	10	10	10

Table 18 - Positive Lock MKII, 250 Series Termination Resistance (mΩ) *(continued)*

	Test Set 59				
Specimen Description	**(1) 14 AWG & (1) 18 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.699	0.680	0.691	0.702	0.710
Maximum	0.800	0.724	0.745	0.750	0.782
Mean	0.736	0.706	0.715	0.729	0.738
Count	10	10	10	10	10
	Test Set 62				
Specimen Description	**(1) 18 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.602	0.609	0.622	0.625	0.607
Maximum	0.733	0.798	0.803	0.815	0.690
Mean	0.658	0.678	0.700	0.707	0.649
Count	10	10	10	10	10
	Test Set 63				
Specimen Description	**(1) 14 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.637	0.652	0.675	0.730	0.651
Maximum	0.681	0.767	0.838	0.845	0.700
Mean	0.651	0.687	0.733	0.768	0.675
Count	10	10	10	10	10
	Test Set 64				
Specimen Description	**(1) 22 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.488	0.479	0.542	0.606	0.485
Maximum	0.790	0.943	1.018	1.086	1.250
Mean	0.638	0.645	0.726	0.796	0.612
Count	10	10	10	10	10

Table 18 - Positive Lock MKII, 250 Series Termination Resistance (mΩ) *(continued)*

	Test Set 65				
Specimen Description	**(1) 18 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.707	0.733	0.742	0.790	0.683
Maximum	0.823	0.908	1.184	1.183	0.790
Mean	0.752	0.794	0.875	0.950	0.752
Count	10	10	10	10	10

	Test Set 66				
Specimen Description	**(1) 14 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.536	0.572	0.585	0.630	0.653
Maximum	0.988	0.851	1.380	1.400	1.341
Mean	0.727	0.650	0.781	0.833	0.776
Count	10	10	10	10	10

	Test Set 67				
Specimen Description	**(1) 10 AWG**				
Maximum Requirement	**Initial 3mΩ Max**	**Following Vibration 6.1mΩ Max**	**Following Humidity 6.1mΩ Max**	**Following Thermal Shock 6.1mΩ Max**	**Following Salt Spray 6.1mΩ Max**
Minimum	0.541	0.619	0.838	1.027	1.014
Maximum	0.629	1.826	6.093	5.220	4.132
Mean	0.582	0.848	1.920	2.161	2.092
Count	10	10	10	10	10

2.12 Vibration

No electrical discontinuities of 1 microsecond or greater were observed during testing.

2.13 Thermal Shock

Specimens showed no signs of damage that would be detrimental to product performance.

2.14 Salt Spray

Specimens showed no signs of damage that would be detrimental to product performance.

3. TEST METHODS

3.1. Initial Examination of Product

A C of C was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts. Where specified, specimens were visually examined for evidence of physical damage that would be detrimental to product performance.

3.2 Crimp Tensile Strength

The specimen was secured with an air jaw that was attached to a free-floating table that was attached to the base of a tensile/compression machine. A self-tightening wire grip to the movable crosshead of the tensile/compression machine. Force was applied in the tensile direction at a rate of 100 mm per minute until reaching specimen failure. See Figure 1 for test setup. Testing was done in accordance with EIA-364-8C.

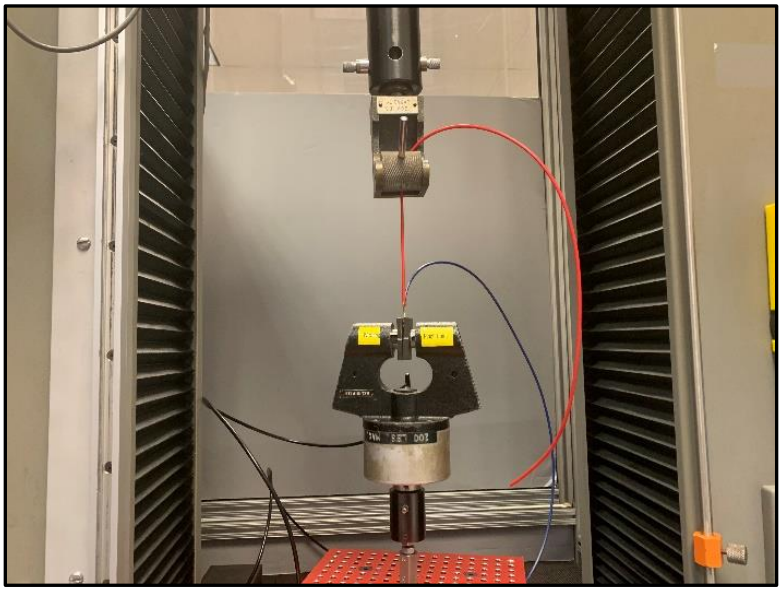

Figure 1 - Tensile Strength Test Setup

3.3 Contact Retention Force

The specimen was secured to a free-floating table that was attached to the base of a tensile/compression machine. A self-tightening wire grip to the movable crosshead of the tensile/compression machine. Force was applied in the tensile direction at a rate of 100 mm per minute until the specimen was broken free from the housing. See Figure 2 for test setup. Testing was done in accordance with EIA-364-29E.

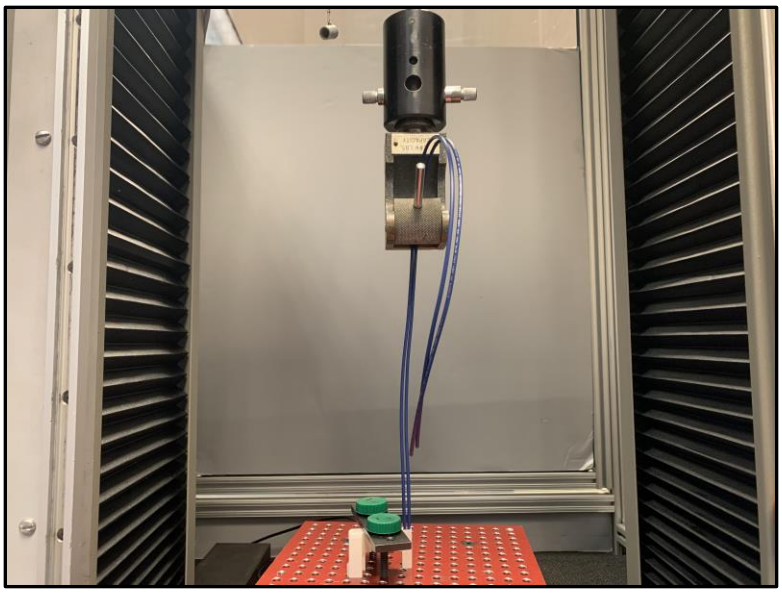

Figure 2 - Contact Retention Force Test Setup

3.4 Contact Locking Strength

Specimen was secured using an air clamp that was mounted to a free-floating X-Y table that was attached to the base of a tensile/ compression machine. The wire end of the specimen was secured in self-tightening clamp or air clamp that was attached to the movable crosshead of the tensile/ compression machine. Force was applied in the tensile direction at a rate of 100 mm per minute. See Figure 3 and 4 for test setup. Testing was done in accordance with EIA-364-13E.

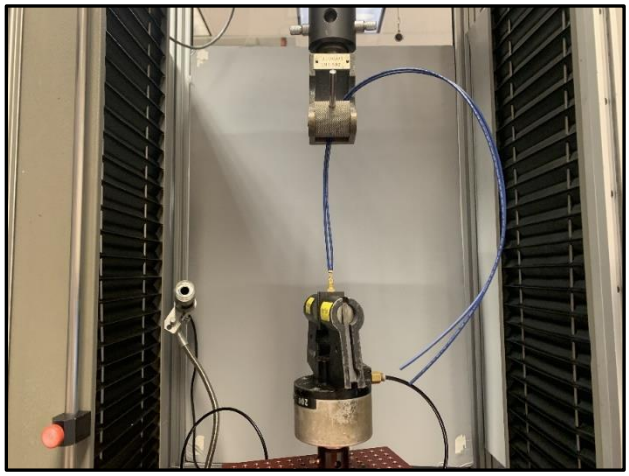

Figure 3 – Contact Locking Strength Test Setup

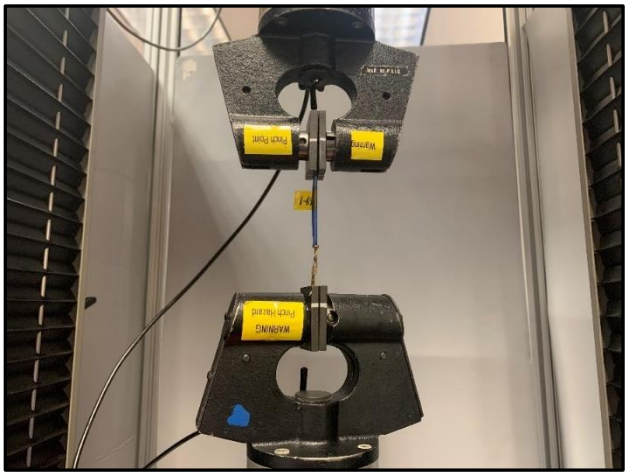

Figure 4 – Contact Locking Strength Test Setup

3.5 Temperature Rise

Thermocouples were attached to the specimens to measure their temperature. The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C, the temperature measurement was recorded. See Figure 5 for test setup. Testing was done in accordance with EIA-364-70D.

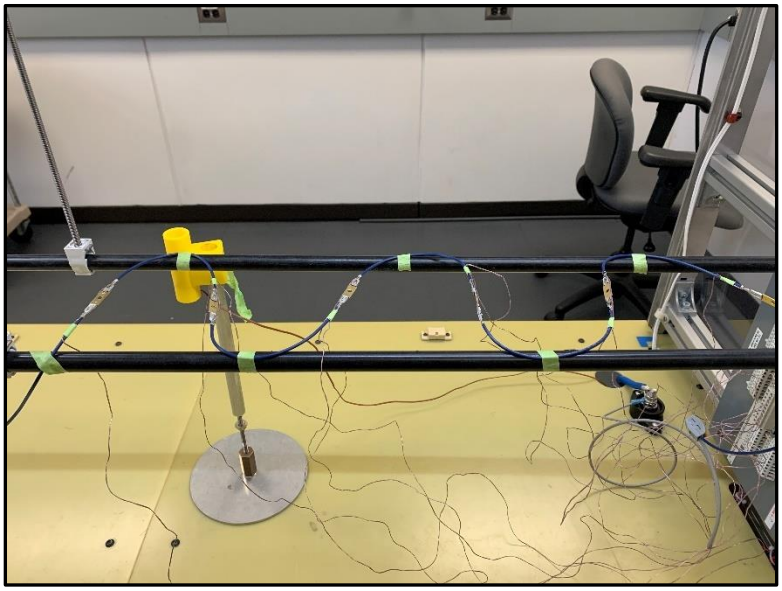

Figure 5 – Temperature Rise Test Setup

3.6 Connector Mating Force

A custom fixture with the test tabs installed was mounted to a free-floating table that was attached to the base of a tensile/ compression machine. A fixture was made to hold the specimen and was attached to the movable crosshead of the tensile/ compression machine. Force was applied in a compression direction at a rate of 100mm per minute until specimen was fully mated. See Figure 6 for test setup. Testing was done in accordance with EIA-364-13E.

3.7 Connector Unmating Force

A custom fixture with the test tabs installed was mounted to a free-floating table that was attached to the base of a tensile/ compression machine. A fixture was made to hold the specimen and was attached to the movable crosshead of the tensile/ compression machine. Force was applied in a tensile direction at a rate of 100mm per minute until specimen was fully unmated. See Figure 6 for test setup. Testing was done in accordance with EIA-364-13E.

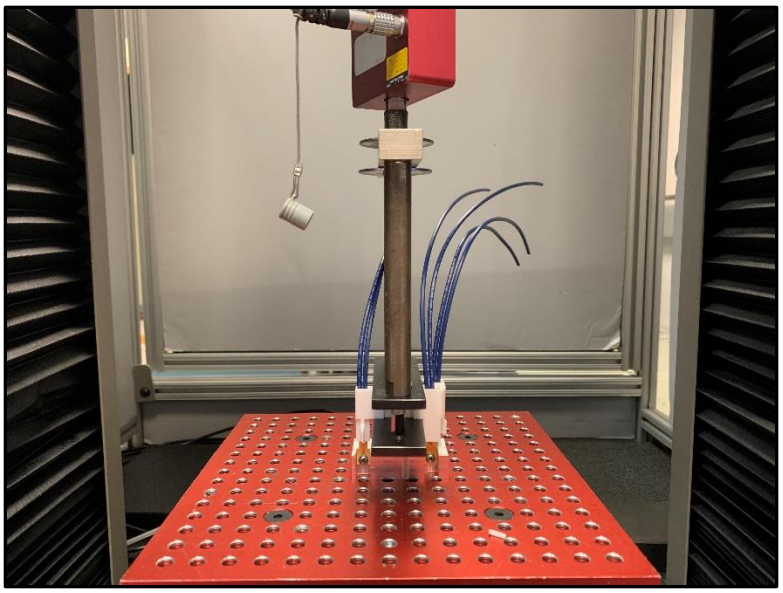

Figure 6 – Connector Mating and Unmating Force Test Setup

3.8 Insulation Resistance

A test potential of 500 volts DC was applied between adjacent contacts of mated specimens for a period of 2 minutes prior to taking measurements. Testing was conducted in accordance with EIA-364-21F. See Figure 7 for test setup.

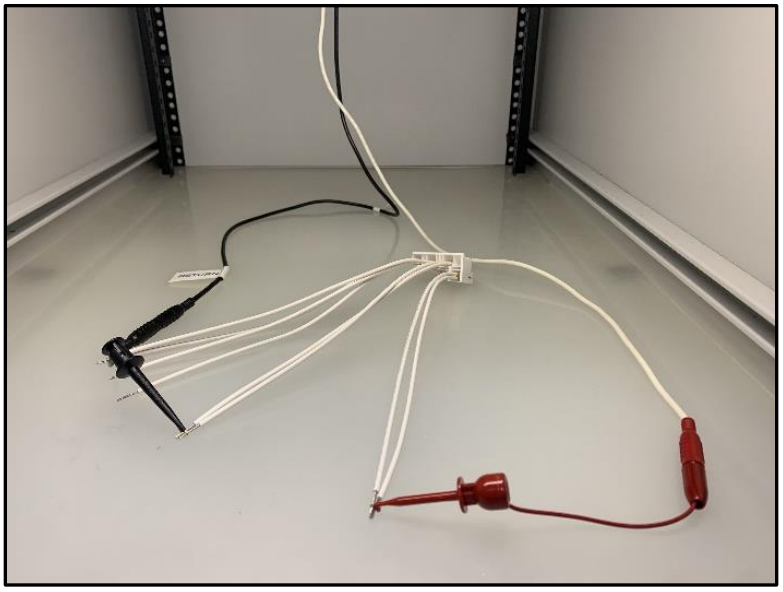

Figure 7 – Insulation Resistance/ Dielectric Withstanding Test Setup

3.9 Dielectric Withstanding Voltage

The specimens were subjected to an internal withstanding voltage in accordance with Test Procedure EIA 364-20F. See Figure 7 for a representative image of the test setup. Test leads were connected to adjacent contacts on mated specimens with the test voltage increased from zero to 2000 VAC at a rate of 500 volts per second. The 2000 VAC was held for one minute and was monitored for breakdown or flashover.

3.10 Humidity Steady State

Specimens were exposed to 96 hours of 90 – 95% R.H. at 40°C. Testing was done in accordance with EIA-364-31F.

3.11 Termination Resistance

Termination resistance measurements were taken at low level current that was made using a four terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20-millivolt maximum open circuit voltage. See Figure 8 for test setup. Testing was done in accordance with EIA-364-23D.

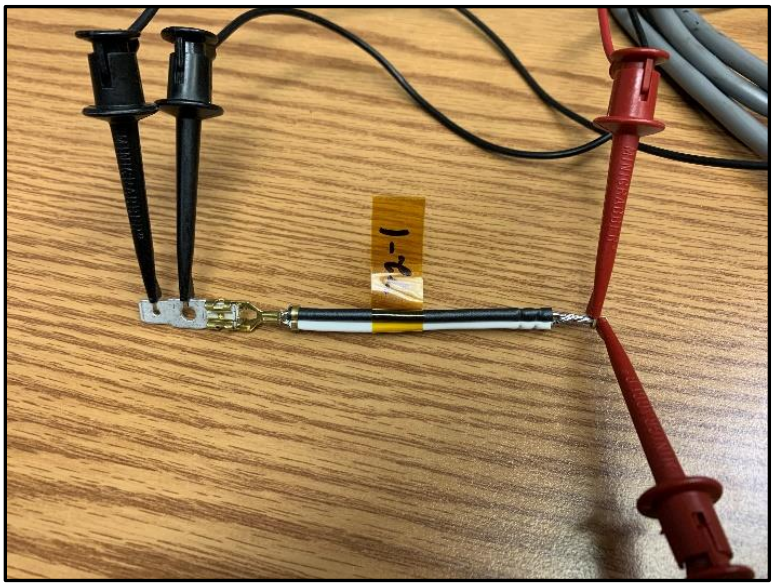

Figure 8 – Termination Resistance Test Setup

3.12 Vibration

The test specimens were subjected to a sinusoidal test as specified in:
TE Product Specification 108-5126 Rev AG, Paragraph 3.5.11; TE Product Specification 108-5127 Rev S, Item 6.1.11 and EIA-364-28F.

This test condition is a simple harmonic motion with an amplitude of 1.52 mm.

The vibration frequency was varied logarithmically between the approximate limits of 10 to 55 Hz. The entire frequency range of 10 to 55 Hz and return to 10 Hz was traversed in approximately 1 minute. The cycle was performed for approximately 2 hours in each of three mutually perpendicular planes. A representative image of the test setup can be seen in Figure 9.

Each test set contained ten test specimens that were wired together in series, monitored for electrical discontinuity of 1 µs or greater duration, and energized with 100 mA of current during testing.

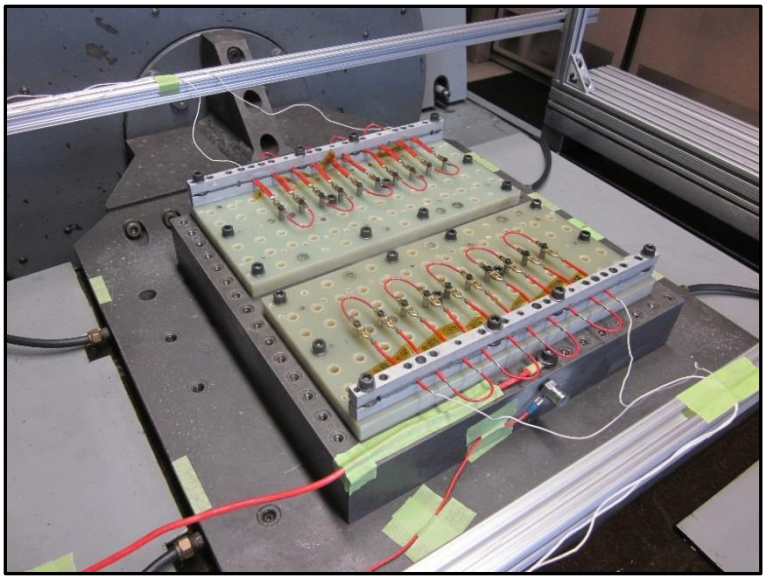

Figure 9 – Representative Vibration Setup

3.13 Thermal Shock

Specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30-minute dwells at -40°C and 105°C. Testing was done in accordance with EIA 364-32G.

3.14 Salt Spray

Test Specimen were subject to a 5% Salt Spray concentration for 96 hours per EIA 364-26C. Upon completion of the test the specimens were rinsed in warm tap water to remove salt deposits for 5 minutes maximum then dried @ 38°C in an air-circulating oven for 12 hours.