Motor Connector Housing

1. INTRODUCTION

1.1 Purpose

Qualification testing was performed on the TE Connectivity (TE) Motor Connector Housing to determine its conformance to the requirements of Product Specification 108-160127 Rev A2.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of TE Motor Connector Housings. Testing was performed at the Harrisburg Electrical Components Test Laboratory (HECTL) between 26-February-2021 and 26-May-2021. Documentation is on file and maintained at HECTL under EA20200419T.

1.3 Conclusion

All specimens as listed in Paragraph 1.5 conformed to the electrical, mechanical, and environmental performance requirements listed in Product Specification 108-160127 Rev A2. See Section 2 for detailed results.

1.4 Product Description

The Motor Connector is designed to mate directly with a variety of appliance timing mechanisms which incorporate the use of a 0.125 inch wide x 0.020 inch thick tabs and 0.250 inch wide x 0.032 inch thick tabs.

1.5 Test Specimens

Test specimens as identified in Table 1 were tested according to the test sequences in Table 2.

Table 1 – Test Specimens

Test Set	Qty	Part number	Description
1	15	1-2349332-0 Rev 10	125/250 Motor Connector Housing
	30	170329-1	250 Series Positive Lock Mark II Receptacle crimped to 10 AWG
	32	1217039-1	125 Timer Contact Gen III Terminal crimped to 14 AWG
2	20	1-2349332-0 Rev 10	125/250 Motor Connector Housing
	40	170329-1	250 Series Positive Lock Mark II Receptacle crimped to 10 AWG
	160	1217039-1	125 Timer Contact Gen III Terminal crimped to 14 AWG
3	9	1-2349332-0 Rev 10	125/250 Motor Connector Housing

1.6 Test Sequence

The test specimens referred to in paragraph 1.4 were tested according to the test sequences listed in Table 2.

Table 2 – Test Sequence

Test or Examination	Test Set		
	1	2	3
	Test Sequence (a)		
Examination of Product	1,4	1,8	1,3
Insulation Resistance		2,6	
Dielectric Withstanding Voltage		3,7	
Contact Insertion Force	2		
Contact Retention Force	3		
Humidity-Temperature Cycling		5	
Thermal Shock		4	
Glow Wire			2

(a) Numbers indicate the 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 Examination of Product – All Test Sets

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2 Insulation Resistance – Test Set 2

Specimens met the initial 1,000 MΩ and the final 100 MΩ insulation resistance requirements.

2.3 Dielectric Withstanding Voltage – Test Set 2

Specimens met the 5 mA maximum leakage current with no voltage creep, discharge or flashover requirements.

2.4 Contact Insertion Force – Test Set 1

The 125 Timer Gen III Contacts and the 250 Series Mk II Contacts for part number 170329-1 had maximum insertion force of 0.90 kg and 1.95 kg respectively, meeting the respective 1.0 kg and 2.0 kg maximum requirements. See Table 3 for a summary of the test results.

Table 3 – Contact Insertion Force Test Results in kg

Contact	125 Timer Gen III Contacts on 14 AWG	250 Series Mk II Contacts on 10 AWG
Part #	**1217039-1**	**170329-1**
Minimum	0.09	0.90
Maximum	0.90	1.95
Mean	0.34	1.40
Std. Dev.	0.20	0.25
Count	32	30

2.5 Contact Retention Force – Test Set 1

The 125 Timer Gen III Contacts and the 250 Series Mk II Contacts had minimum retention forces of 5.05 kg and 9.32 kg respectively, meeting the respective 4.0 kg and 6.0 kg minimum requirements. See Table 4 for a summary of the test results.

Table 4 – Contact Retention Force Test Results in kg

Contact	125 Timer Gen III Contacts on 14 AWG	250 Series Mk II Contacts on 10 AWG
Part #	**1217039-1**	**170329-1**
Minimum	5.05	9.32
Maximum	12.47	10.90
Mean	8.88	10.17
Std. Dev.	1.58	0.37
Count	32	30

2.6 Humidity-Temperature Cycling – Test Set 2

After subjecting the specimens to temperature / humidity cycling, there were no indications of cracking, breaking or other damage which would interfere with the performance requirements of the subsequent tests on the specimens.

2.7 Thermal Shock – Test Set 2

After subjecting the specimens to thermal shock, there were no indications of cracking, breaking or other damage which would interfere with the performance requirements of the subsequent tests on the specimens.

2.8 Glow Wire – Test Set 3

The specimens conformed to IEC 60335-1 Edition 5.2 dated 2016-05 when tested at 750°C with a maximum allowable flame duration of 2.0 seconds. There was no flame present for any of the specimens. See Table 5 for results for 750°C glow wire testing. Figures 1 through 3 show the specimens following testing.

Table 5 – 750°C Glow Wire Test Results

Spec. #	Temp. (°C)	Point of Application	Pass /Fail
401	750	Front	Pass
402	750	Front	Pass
403	750	Front	Pass
404	750	Side	Pass
405	750	Side	Pass
406	750	Side	Pass
407	750	Mating Face	Pass
408	750	Mating Face	Pass
409	750	Mating Face	Pass

Figure 1 – Glow Wire Test Results – Front

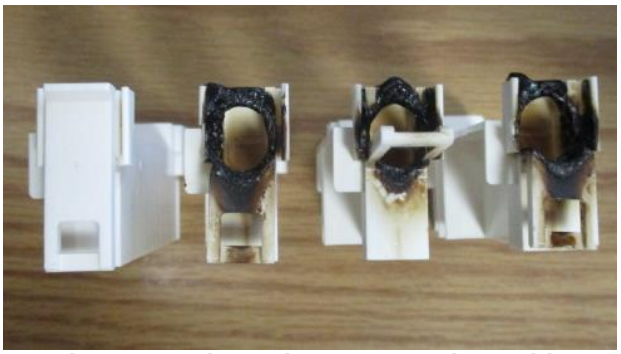

Figure 2 – Glow Wire Test Results – Side

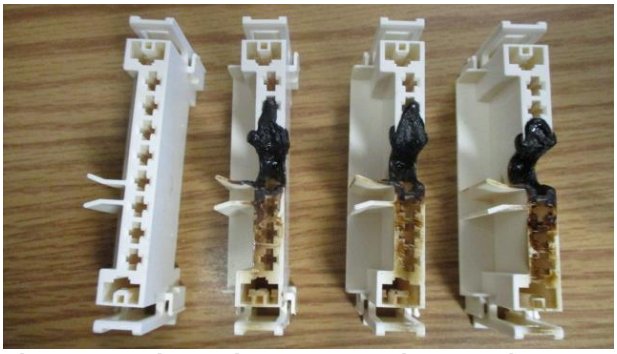

Figure 3 – Glow Wire Test Results – Mating Face

3. TEST METHODS

3.1 Examination of Product – All Test Sets

Specimens were visually examined for evidence of physical damage detrimental to product performance in accordance with EIA-364-18B.

3.2 Insulation Resistance – Test Set 2

Unmated specimens were subjected to an insulation resistance test in accordance with EIA 364-21F. See Figure 4 and Figure 5 for representative images of testing.

A voltage of 500 VDC was applied and held for 2 minutes. After the 2 minute hold, the resistance was immediately recorded. Unmated specimens were tested between contacts in adjacent circuits by tying alternating circuits together. For testing between the housing and all contacts, the housing was placed in grounded lead shot and all contacts were tied together with the positive voltage lead applied. A small piece of G10 was taped to the bottom of the housing to prevent lead shot from entering the housing and shorting the contacts directly to ground.

3.3 Dielectric Withstanding Voltage – Test Set 2

Unmated specimens were subjected to a dielectric withstanding voltage (DWV) test in accordance with EIA 364-20F. See Figures 4 and 5 for representative images of testing.

A voltage of 2.2 kilovolts AC at sea level was applied and held for 1 minute. After the 1 minute hold, the leakage current was immediately recorded. Unmated specimens were tested between contacts in adjacent circuits by tying alternating circuits together. For testing between the housing and all contacts, the housing was placed in grounded lead shot and all contacts were tied together with the positive voltage lead applied. A small piece of G10 was taped to the bottom of the housing to prevent lead shot from entering the housing and shorting the contacts directly to ground.

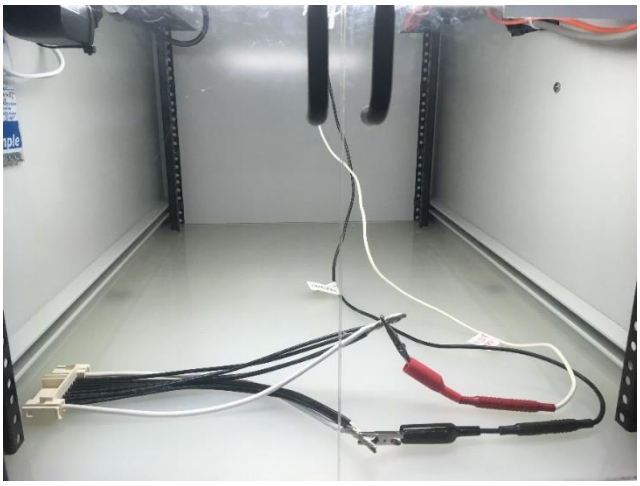

Figure 4 – Insulation Resistance and DWV Test Setup – Contact to Contact

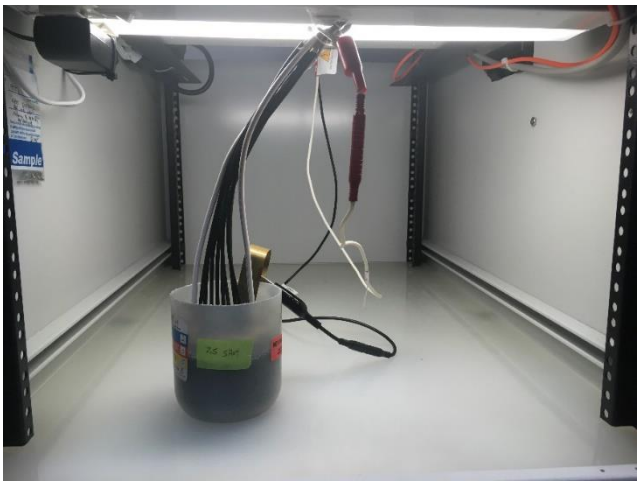

Figure 5 – Insulation Resistance and DWV Test Setup – Contacts to Housing

3.4 Contact Insertion Force – Test Set 1

Specimens were subjected to a contact insertion force test using a tensile / compression machine in accordance with EIA-364-5C. See Figure 6 for a representative image of the test setup.

The specimen housing was held in a vice attached to a free-floating XYR alignment table secured to the base of the tensile / compression machine. The terminal was held in a modified drill chuck fixture attached to the load cell and crosshead of the tensile / compression machine. The terminal was then aligned above the terminal cavity in the housing. The crosshead was then lowered at a rate of 12.7 mm/min until the terminal was fully inserted into the housing cavity. The peak insertion force and the force graph were recorded.

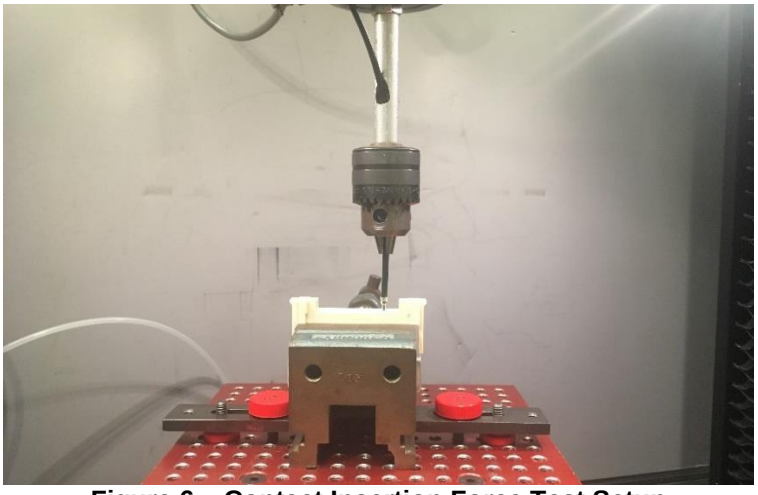

Figure 6 – Contact Insertion Force Test Setup

3.5 Contact Retention Force – Test Set 1

Specimens were subjected to a contact extraction force test using a tensile / compression machine in accordance with EIA-364-29D, Method A. See Figure 7 for a representative image of the test setup.

The specimen housing was secured to a free-floating XYR alignment table attached to the base of the tensile / compression machine using hold-downs. The wire was held in air jaws attached to the load cell and crosshead of the tensile / compression machine. The crosshead was then raised at a rate of 25.4 mm/min until the required force was reached. After a 6 second hold, the receptacle was pulled to failure. The peak extraction force and the force graph were recorded.

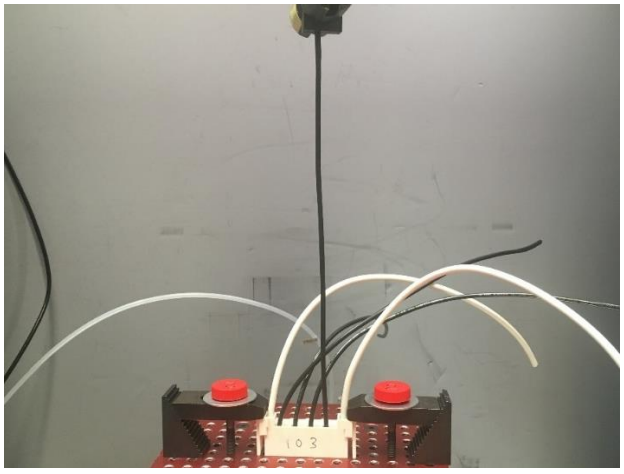

Figure 7 – Contact Extraction Force Test Setup

3.6 Humidity-Temperature Cycling – Test Set 2

Unmated specimens were subjected to a temperature / humidity test in accordance with EIA 364-31F, Method IV. The specimens were subjected to ten 24-hour cycles between 25°C and 65° at 80-98%RH.

3.7 Thermal Shock – Test Set 2

Unmated specimens were subjected to a thermal shock test in accordance with EIA 364-32G, Method A, Test Condition VIII. The specimens were subjected to 25 cycles between 40°C and 105°C with 30-minute dwell times at each temperature extreme and 1-minute maximum transition between temperatures.

3.8 Glow Wire – Test Set 3

Specimens were subjected to conditioning before glow wire testing in accordance with IEC 60695-2-11. They were conditioned for a minimum of 24 Hours between 15 to 35°C and 45 to 75% Relative Humidity.

The specimens were subjected to the Glow Wire test per IEC 60695-2-11 Edition 2.0 Dated 2014-02 for a duration of 30 seconds at 750°C ± 10°C with a glow wire penetration depth of 7 mm. All test specimens were tested unmated. The specimens were tested in three orientations as shown in Figures 8 through 10 and were orientated whereas not to impede the material from burning up the test specimen or dripping down to the specified layer (wrapping tissue paper). The tester observed each test specimen for flame height, flame duration, and burning of the specified layer.

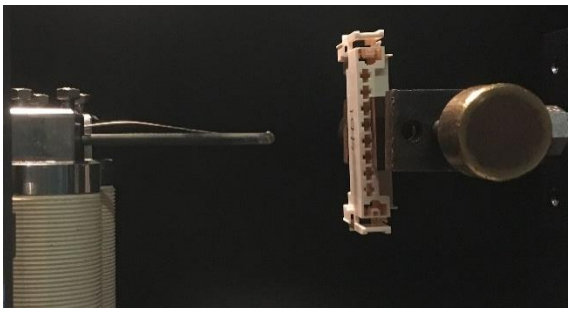

Figure 8 – Glow Wire Test Setup – Front

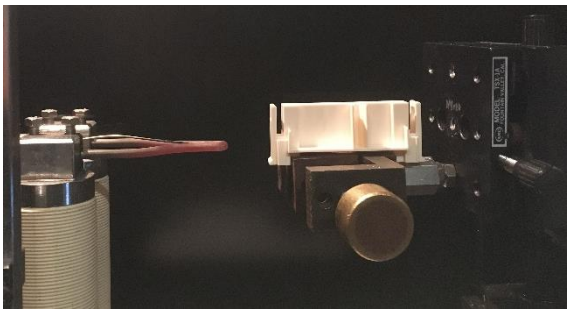

Figure 9 – Glow Wire Test Setup – Side

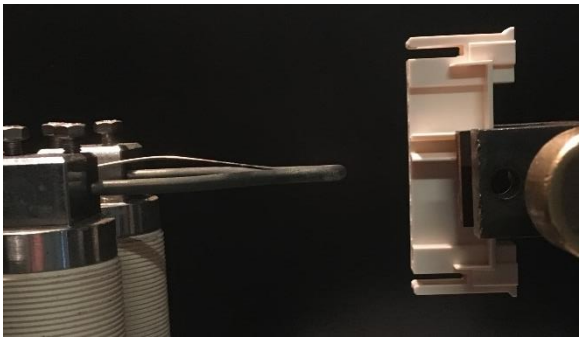

Figure 10 – Glow Wire Test Setup – Mating Face