



Metrimate Series Plug & Receptacle Housing

1. INTRODUCTION

1.1 Purpose

Testing was conducted to verify the Metrimate Series Plug and Receptacle Housings molded with Ascend Vydne FR350J resin with 2% black colorant p/n 3-2136700-3 (virgin) meet the requirements of 108-10033, Rev. G, Test Groups 2, 4 & 5.

1.2 Scope

This report covers the electrical, environmental and mechanical performance of the Metrimate Connector. Testing performed at the Harrisburg Electrical Components Test Laboratory (HECTL/HFOCTL) between December 13, 2019 and January 09, 2020. Detailed test data is on file and maintained at HECTL under EA20190523T.

1.3 Conclusion

All test groups/Test Sets successfully met the electrical (Insulation Resistance & Dielectric Withstanding Voltage), environmental (Steady-State Humidity & Thermal Shock) and mechanical (Housing Locking Strength & Housing Panel Retention) requirements as specified by 108-10033, Rev G. Refer to section 2 for detailed results.

1.4 Test Specimens

See Table 1 for the allocation and attributes of the specimens submitted for testing. The listing is as identified by the submitted request.

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Table 1 – Specimen Identification

| Test Set | Quantity | Part Number | Description |
|----------|----------|-------------|--|
| 1 | 5 | 207015-1 | 4 Position Metrimate Plug Housing. Fully loaded with 66100-9 |
| | 20 | 66100-9 | Type III Socket Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 Au in mating area + tin in crimp, Strip. Crimped to 8" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| | 5 | 207016-1 | 4 Position Metrimate Receptacle Housing. Fully loaded with 66098-9 |
| | 20 | 66098-9 | Type III Pin Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 PdNi in mating area + tin in crimp, Strip. Crimped to 8" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| 2 | 5 | 207019-1 | 36 Position Metrimate Plug Housing. Fully loaded with 66100-9 |
| | 180 | 66100-9 | Type III Socket Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 Au in mating area + tin in crimp, Strip. Crimped to 8" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| | 5 | 207020-1 | 36 Position Metrimate Receptacle Housing. Fully loaded with 66098-9 |
| | 180 | 66098-9 | Type III Pin Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 PdNi in mating area + tin in crimp, Strip. Crimped to 8" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| 3 | 5 | 207015-1 | 4 Position Metrimate Plug Housing. |
| 3 | 5 | 207016-1 | 4 Position Metrimate Receptacle Housing. |
| 4 | 5 | 207019-1 | 36 Position Metrimate Plug Housing. |
| 4 | 5 | 207020-1 | 36 Position Metrimate Receptacle Housing. |
| 5 | 5 | 207015-1 | 4 Position Metrimate Plug Housing. Fully loaded with 66100-9 |
| | 20 | 66100-9 | Type III Socket Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 Au in mating area + tin in crimp, Strip. Crimped to 12" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| | 5 | 207016-1 | 4 Position Metrimate Receptacle Housing. Fully loaded with 66098-9 |
| | 20 | 66098-9 | Type III Pin Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 PdNi in mating area + tin in crimp, Strip. Crimped to 12" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2. |
| 6 | 4 | 207019-1 | 36 Position Metrimate Plug Housing. Fully loaded with 66100-9 |
| | 180 | 66100-9 | Type III Socket Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 Au in mating area + tin in crimp, Strip. Crimped to 12" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2 |
| | 4 | 207020-1 | 36 Position Metrimate Receptacle Housing. Fully loaded with 66098-9 |
| | 180 | 66098-9 | Type III Pin Contact, 16-18 AWG, Ø.080-.100 Insulation, 30 PdNi in mating area + tin in crimp, Strip. Crimped to 12" of 18 AWG stranded, tin plated copper, Ø.105 insulation, 150°C per 1690276-2. |

1.5 Test Sequence

Refer to Table 2 for the testing sequence performed on the specimens listed in Table 1.

Table 2- Test Sequence

| Test or Examination | Test Sets 1 - 2 | Test Sets 3 - 4 | Test Sets 5 - 6 |
|---------------------------------|----------------------|-----------------|-----------------|
| | 108-10033 Test Group | | |
| | Group 2 | Group 4 | Group 5 |
| | Test Sequence (a) | | |
| Examination of Product | 1 | 1 | 1 |
| Insulation Resistance | 4 | - | - |
| Dielectric Withstanding Voltage | 5 | - | - |
| Housing Panel Retention | - | - | 2 |
| Housing Locking Strength | - | 2 | - |
| Thermal Shock, 50 Cycles | 2 | - | - |
| Humidity, Steady-State | 3 | - | - |

(a) Numbers indicate the sequence in which tests were performed.

1.6 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 (Test Sets 1-6)

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed prior to environmental or mechanical testing.

2.2 Insulation Resistance (Test Sets 1-2)

Refer to Table 3 and Table 4 for insulation resistance data in Giga-ohms. All recorded values were significantly above the minimum requirement of 100 megohms for the product insulation resistance.

Table 3 – Insulation Resistance Data (Test Set 1 – “4-Position”)

| | Test Set 1 Plug | Test Set 1 Receptacle |
|-----------------|-----------------|-----------------------|
| | Giga-ohms (GΩ) | |
| Min | 19.00 | 28.60 |
| Max | 75.00 | 58.00 |
| Mean | 40.88 | 41.24 |
| Std Dev. | 24.38 | 11.79 |
| Count | 5 | 5 |

Table 4 – Insulation Resistance Data (Test Set 2 – “36-Position”)

| | Test Set 2 Plug | Test Set 2 Receptacle |
|-----------------|-----------------|-----------------------|
| | Giga-ohms (GΩ) | |
| Min | 3.09 | 13.45 |
| Max | 49.40 | 35.50 |
| Mean | 25.22 | 24.02 |
| Std Dev. | 12.71 | 6.04 |
| Count | 25 | 25 |

2.3 Dielectric Withstanding Voltage (Test Sets 1-2)

Refer to Table 5 and Table 6 for product dielectric withstanding voltage (DWV) leakage current data in microamps (μA). All specimens met the specified requirements of no breakdown or flashover and less than 5.0 mA of leakage current.

Table 5 – DWV Leakage Current Data in Microamps (Test Set 1 – “4-Position”)

| | Test Set 1 Plug | Test Set 1 Receptacle |
|-----------------|-----------------|-----------------------|
| | Microamps (μA) | |
| Min | 8.99 | 9.19 |
| Max | 11.27 | 12.51 |
| Mean | 9.84 | 10.17 |
| Std Dev. | 0.86 | 1.39 |
| Count | 5 | 5 |

Table 6 – DWV Leakage Current Data (Test Set 2 – “36-Position”)

| | Test Set 2 Plug | Test Set 2 Receptacle |
|-----------------|-----------------|-----------------------|
| | Microamps (μA) | |
| Min | 11.19 | 11.12 |
| Max | 25.12 | 21.90 |
| Mean | 17.01 | 16.64 |
| Std Dev. | 3.51 | 2.75 |
| Count | 25 | 25 |

2.4 Housing Panel Retention (Test Sets 5-6)

A review of the Housing Panel Retention performance among the two Test Sets of Metrimate samples examined found full compliance as detailed by the Product Specification 108-10033, Rev G. The 4-position and 36-position Metrimate connectors successfully held the specified 50 & 80 pound load respectively for a full minute and in multiple orientations without observable change detrimental to product performance.

2.5 Housing Locking Strength (Test Sets 3-4)

A review of the Housing Lock Strength performance among the two groups of 5 samples examined found full compliance as detailed by the Product Specification 108-10033, Rev G. All samples remained locked during the specified 10 pounds load.

2.6 Thermal Shock (Test Sets 1-2)

None of the specimens showed any signs of physical damage that would be detrimental to product performance after being subjected to 10 cycles of thermal shock.

2.7 Humidity, Steady State (Test Sets 1-2)

No physical damage detrimental to product performance was visible due to thermal shock exposure.

3. TEST METHODS

3.1 Examination of Product (Test Sets 1-6)

Specimens were visually examined with an unaided eye as defined by EIA-364-18B.

3.2 Insulation Resistance (Test Sets 1-2)

The Insulation Resistance examinations were performed on unmated connectors with an applied test voltage of 500 volts DC. The electrification time was two minutes before the resistance measurement according to EIA-364-21E. The measurements were acquired immediately following the humidity exposure (within 1 hour of removal of samples) with Insulation Resistance measured between adjacent contacts. Refer to Figure 1 for images of the typical test setup.

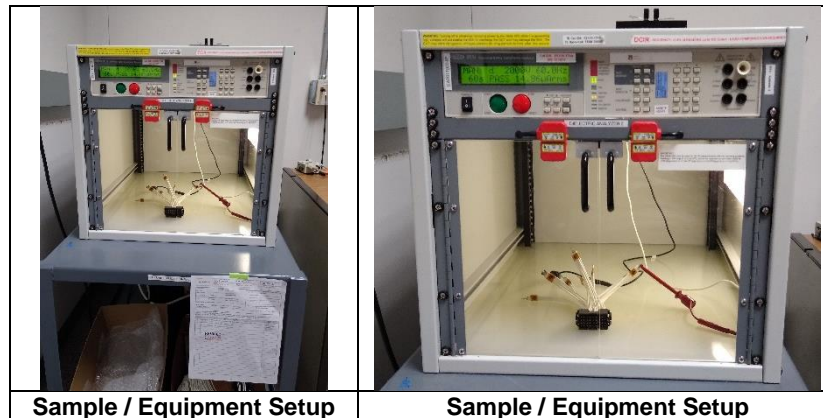


Figure 1 – Insulation Resistance / Dielectric Withstanding Voltage – Test Setup / Equipment

3.3 Dielectric Withstanding Voltage (Test Sets 1-2)

The Dielectric Withstanding Voltage examinations were performed with a test potential of 2000 volts AC applied between the adjacent contacts of the unmated specimens according to EIA-364-20F, Method B. This potential was applied for one minute and then returned to zero. Refer to Figure 1 for images of the typical test setup.

3.4 Housing Panel Retention (Test Sets 5-6)

Two primary baseplate forks were used as the holding fixture for the Metrimate panels provided with the test package for testing the samples specified Housing Panel Retention. A large #36 drill chuck was used to clamp the sample bundle of pigtail wire (18 AWG) to provide the specified loading profile. Refer to Figure 2 & Figure 3 for setup photos.

The Metrimate panels provided were captivated by one of two bottom forked fixtures. The setup configuration referred by the 108-10033 is found in Figure 2 below. As indicated by Figure 2, the retention setup requires a 0-degree tensile examination (using bundled pigtails) and a 180-degree compression examination stress applied to the housing/panel.

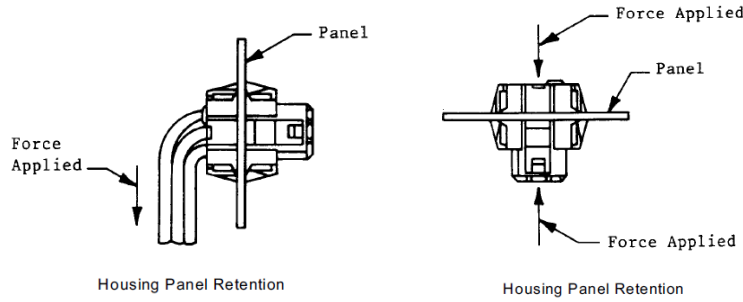


Figure 2: Product Specification Info – 108-10033, Rev. G, Figures 3 & 4, Housing Panel Retention.

Figure 3 below provides representative images for the Housing Panel Retention examination.

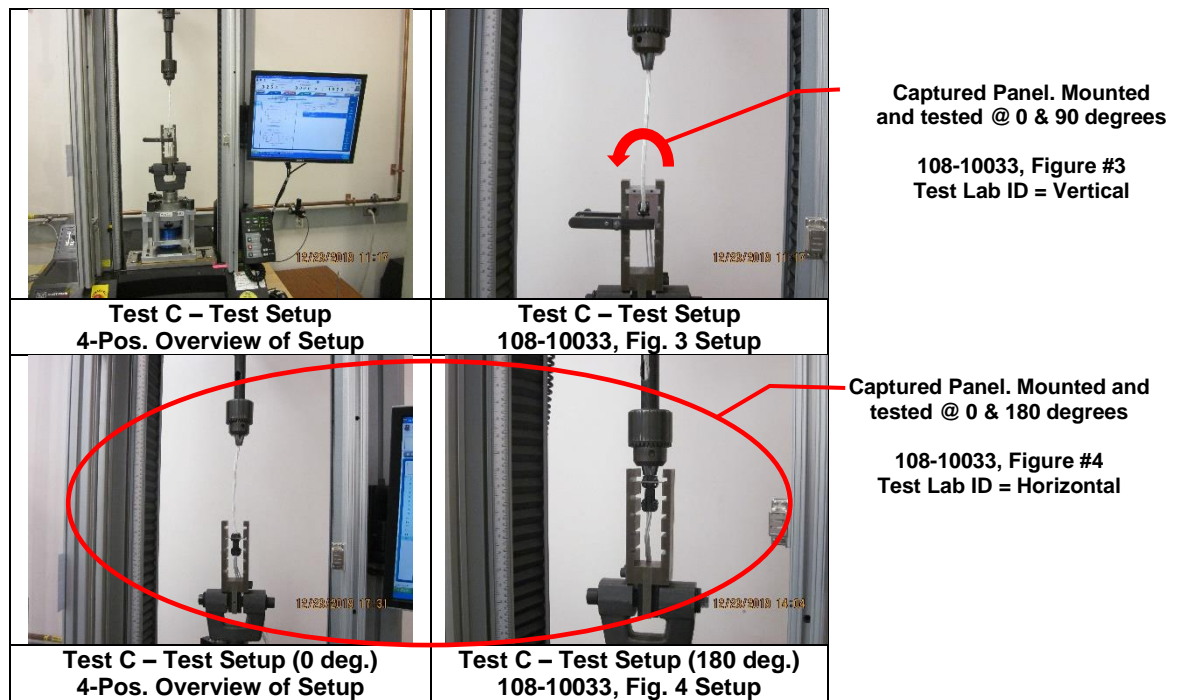


Figure 3: Housing Panel Retention - Representative Test Setup Images (4-Position Metrimate)

3.5 Housing Locking Strength (Test Sets 3-4)

The Metrimate plug and receptacle were inserted into the requester supplied panel plates (with plate latch). The sample plug/receptacle were then mated and placed between the opposing forked fixtures - Refer to Figure 4 for images of the typical test setup.

A programmed triangle load/extension profile was then applied to the sample. The Housing Lock Strength examination was performed as specified at 0.5 in/min (12.7mm/min) separation to peak at 10 pounds and returned to zero according to EIA-364-98. The maximum value of each tensile profile was recorded.



Figure 4: Housing Locking Strength – Test Setup / Equipment)

3.6 Thermal Shock (Test Sets 1-2)

Unmated specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30-minute dwells at -55 and 105°C in accordance with EIA-364-32G, Method A, Condition VII, Duration A4. The transition between temperatures was less than one minute. Refer to Figure 5 for images of the test setup

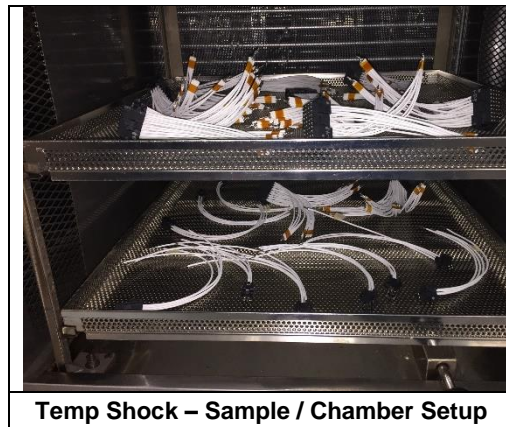


Figure 5: Thermal Shock - Test Setup / Equipment Image

3.7 Humidity, Steady State (Test Sets 1-2)

Mated samples were subjected to the specified preconditioning and steady state 10-day exposure of elevated temperature and humidity according to EIA-364-31F, Method II, Duration B. The maintained environmental conditions – 40°C & 92.5 % (90-95%). Refer to Figure 6 for images of the test setup.

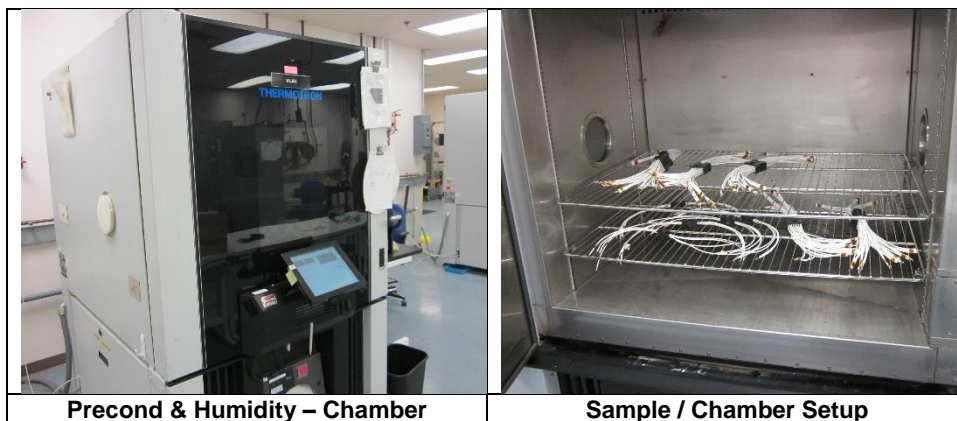


Figure 6: Steady State Humidity – Test Setup / Equipment