FASTON* .187 Ultra-Pod Flag Receptacle Assembly

1. INTRODUCTION

1.1. Purpose

Testing was performed on the FASTON* .187 Ultra-Pod Flag Receptacle Assembly to determine its conformance to the requirements of Product Specification 108-2215 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the FASTON .187 Ultra-Pod Flag Receptacle Assembly. Testing was performed at the Engineering Assurance Product Test Laboratory between 04Oct04 and 23Nov04. The test file number for this testing is CTL7112-032. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The FASTON .187 Ultra-Pod Flag Receptacle Assembly listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2215 Revision A.

1.4. Product Description

The FASTON .187 Ultra-Pod Flag Receptacle Assembly consists of a FASTON receptacle body that is partially assembled in an insulated housing and mated with FASTON tabs.

1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,6,7,8	130	521600-2	.187 Ultra-Pod Flag Receptacle Assembly with 18 AWG
2	20	521600-2	.187 Ultra-Pod Flag Receptacle Assembly with 20 AWG
1,2	40	521600-2	.187 Ultra-Pod Flag Receptacle Assembly with 22 AWG
4,5	40	521600-2	.187 Ultra-Pod Flag Receptacle Assembly

Figure 1

1.6. Environmental Conditions

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

- Temperature: 15 to 35˚C
- Relative Humidity: 25 to 75%

* Trademark
| Indicates change

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Examination of product	1,5	1,4	1,4	1,3	1,3	1,3	1,3	1,9
Low level contact resistance								2,7
Withstanding voltage, Test Condition A		2	3					
Withstanding voltage, Test Condition C				2				
Withstanding voltage, receptacle, tab entry position					2			
Temperature rise vs current	2,4©)							3,8
Current cycling	3©)							
Crimp tensile		3						
Durability								4
Contact retention						2		
Engagement/disengagement force							2	
Humidity-temperature cycling								6
Temperature life								5
Heat age			2					

NOTE (a) *See paragraph 4.1.A.*
(b) *Numbers indicate sequence in which tests are performed.*
(c) *Temperature rise and voltage drop measurements during current cycling are to be collected simultaneously. Prepare samples in accordance with UL 310.*

Figure 2

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test Groups

A First Article Sample Report was issued by product assurance and product conformed to print requirements. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance - Test Group 8

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 1 milliohm initially and 5 milliohms after testing.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
8	30	Initial	0.64	0.86	0.72
		Final	0.90	3.22	1.42

NOTE *All values in milliohms.*

Figure 3

2.3. Withstanding Voltage, Test Condition A - Test Groups 2 and 3

No dielectric breakdown or flashover occurred when the test voltage was applied between the terminal and lead shot.

2.4. Withstanding Voltage, Test Condition C - Test Group 4

No dielectric breakdown or flashover occurred when the test voltage was applied between the terminal and a metal plate.

2.5. Withstanding Voltage, Receptacle, Tab Entry Position - Test Group 5

No dielectric breakdown or flashover occurred when the test voltage was applied between the terminal and a metal plate.

2.6. Temperature Rise vs Current - Test Groups 1 and 8

All specimens had a temperature rise of less than 30˚C above ambient initially and 45˚C above ambient after testing when tested using the current specified in Figure 4.

Test Group	Wire Size (AWG)	Test Current (amperes)	Maximum Temperature Rise Above Ambient (˚C)
1 Initial	22	3	2.5
1 Final	22	3	2.4
1 Initial	18	7	6.1
1 Final	18	7	6.7
8 Initial	18	7	5.6
8 Final	18	7	14.8

Figure 4

2.7. Current Cycling - Test Group 1

No evidence of physical damage was visible after 500 current cycles. All specimens had a temperature rise of less than 85˚C above ambient and less than a 15˚C change in temperature rise between the 24th and 500th cycles when current specified in Figure 5 was applied. All specimens had voltage drops below the maximum requirement after the 24th and 500th cycles.

Cycle Number	Wire Size (AWG)	Test Current (amperes)	Maximum Temperature Rise Above Ambient (˚C)	Maximum Millivolt Drop	
				Actual	Requirement
24	22	6	8.4	4.3	14
24	18	14	23.3	12.7	17
500	22	6	8.1	4.5	18
500	18	14	23.6	12.9	21

Figure 5

2.8. Crimp Tensile - Test Group 2

All crimp tensile were greater than 35.6 N [8 lbf] for 22 AWG; 57.8 N [13 lbf] for 18 AWG; and 88.9 N [20 lbf] for 18 AWG.

2.9. Durability - Test Group 8

No physical damage occurred as a result of manually mating and unmating the specimens 6 times.

2.10. Contact Retention - Test Group 6

All contact retention force measurements were greater than 44.5 N [10 lbf].

2.11. Engagement/Disengagement Force - Test Group 7

All engagement and disengagement forces were less than 44.5 N [10 lbf] for the 1st insertion; less than 88.9 N [20 lbf] for the 1st withdrawal; greater than 13.3 N [3 lbf] for the 1st withdrawal; and greater than 8.9 N [2 lbf] for the 6th withdrawal.

2.12. Humidity-temperature Cycling - Test Group 8

No evidence of physical damage was visible as a result of exposure to humidity-temperature cycling.

2.13. Temperature Life - Test Group 8

No evidence of physical damage was visible as a result of exposure to temperature life.

2.14. Heat Age - Test Group 3

No evidence of physical damage was visible as a result of exposure to heat age.

2.15. Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Examination of Product

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 6). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage. A voltage drop wire was soldered to each test wire at the midpoint between terminals. The other voltage drop measurement point was on the tab 1.5 mm [.06 in] from the end of the housing. Wire bulk resistance for 76.2 mm [3 in] of wire was subtracted from measurements.

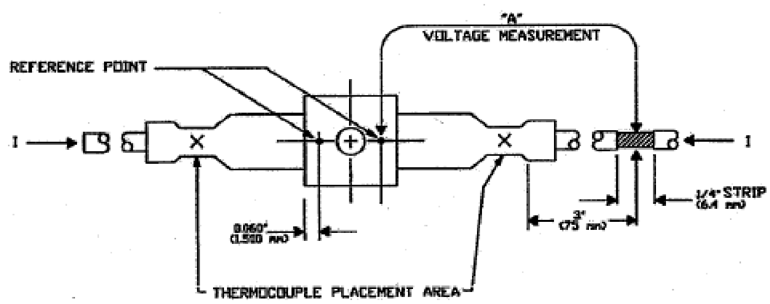

Figure 6
Low Level Contact Resistance Measurement Points

3.3. Withstanding Voltage, Test Condition A

A test potential of 3400 volts AC was applied between the terminal and a beaker containing #12 lead shot. The shot was approximately 2.54 mm [.1 in] below the open, wire receiving end of the housing. The mating end of the housing, and the opposite open end were covered with dielectric wax to prevent the entry of shot into the housing. This potential was applied at a rate of 500 volts per second, held for 1 minute, and then returned to zero. Maximum leakage current was set at 1 milliampere.

3.4. Withstanding Voltage, Test Condition C

A test potential of 3000 volts AC was applied between the terminal and a metal plate on the wire receiving end of the housing. This potential was applied at a rate of 500 volts per second, held for 1 minute, and then returned to zero. Maximum leakage current was set at 1 milliampere.

3.5. Withstanding Voltage, Receptacle, Tab Entry Position

The tab entry end of the receptacle housing was placed on a metal plate and a test potential of 1000 volts AC was applied between the metal plate and the receptacle. This potential was applied at a rate of 500 volts per second, held for 1 minute, and then returned to zero. Maximum leakage current was set at 1 milliampere.

3.6. Temperature Rise vs Current

Temperature was measured while energized at specified current. Thermocouples were attached to the back of the wire crimp of each specimen. The ambient temperature was subtracted from the 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.

3.7. Current Cycling

Testing consisted of 500 cycles of current cycling, with each cycle having current ON for 45 minutes and current OFF for 15 minutes. The test current was as specified in Figure 7.

Wire Size (AWG)	Test Current (amperes)		Test Voltage Drop (millivolts maximum)		Temperature Rise	
	Heating	Cycling	24 Cycles	500 Cycles	Heating	Cycling
22	3	6	14	18	30˚C maximum initial 45˚C maximum final	85˚C maximum
18	7	14	17	21		

Figure 7

3.8. Crimp Tensile

Specified axial load was applied to each specimen wire at a rate of 25.4 mm [1 in] per minute.

3.9. Durability

Specimens were manually mated and unmated 6 times.

3.10. Contact Retention

An axial load of 44.5 N [10 lbf] was applied at a maximum rate of 12.7 mm [.5 in] per minute to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.11. Engagement/Disengagement Force

The force required to insert individual tabs into a FASTON receptacle was measured using a tension/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute. The tab was inserted 6 times. The force required to withdraw individual tabs from a FASTON receptacle was measured using a tension/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute. The tab was withdrawn 6 times.

3.12. Humidity-Temperature Cycling

Mated specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65˚C twice while maintaining high humidity (Figure 8).

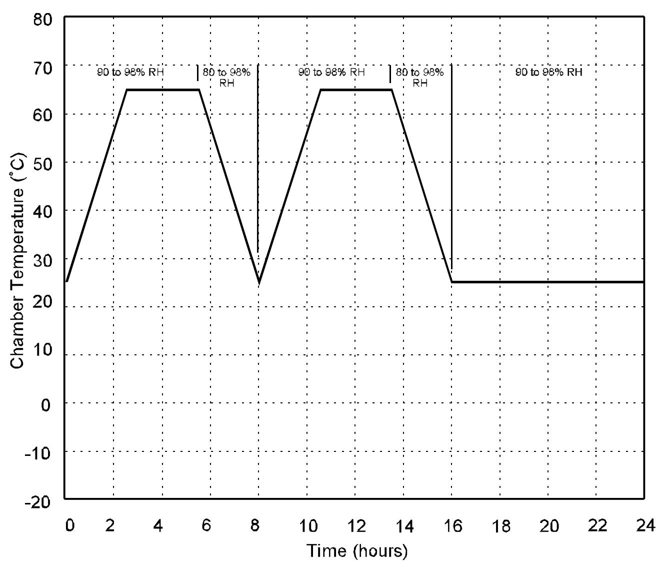

Figure 8
Typical Humidity-Temperature Cycling Profile

3.13. Temperature Life

Mated specimens were exposed to a temperature of 118˚C for 33 days. Specimens were preconditioned with 6 cycles of durability.

3.14. Heat Age

Wired and unmated specimens were exposed to a temperature of 136°C for 7 days.

3.15. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.