Connector, Flat Cable Round Conductor, AMP-LATCH* Novo Receptacles

1. INTRODUCTION

1.1. Purpose

Testing was performed on AMP-LATCH* Novo Receptacles to determine their conformance to the requirements of Product Specification 108-40000 Revision C.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMP-LATCH Novo Receptacles. Testing was performed at the Harrisburg Electrical Components Test Laboratory between 02Dec90 and 06Jun91. The test file number for this testing is CTL5730-115-016. Additional testing on alternate plating was performed between 09Sep08 and 31Oct08. The test file number for this additional testing is EA20080505T. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory.

1.3. Conclusion

The AMP-LATCH Novo Receptacles listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-40000 Revision C.

1.4. Product Description

AMP-LATCH Novo receptacles are designed to crimp to .050 inch centerline ribbon cable, wire sizes 30, 28 and 26 solid and 28 and 26 stranded) AWG. Complete assemblies mate to .025 inch square posts on .100 inch centerline. The contacts are a copper alloy with duplex plated gold on the mating end and tin/lead on the termination end. The housing material is black thermoplastic UL 94V-0.

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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
Test Report CTL5730-115-016			
1,2,3,4	5 each	746288-9	40 position 30 µin Au receptacle
1,2,3	5 each	499997-9	40 position 15 µin Au receptacle
	5 each	103308-8	15 µin Au header
	5 each	104339-8	30 µin Au header
Test Report EA20080505T			
1,2,3,4,7	25 each	5104340-8	3 µin Au flash over 12 µin Pd/Ni header
	25 each	104340-7	15 µin Au header
	25 each	103309-7	30 µin Au header
	25 each	5103309-8	3 µin Au flash over 27 µin Pd/Ni header
	25 each	2057173-1	3 µin Au flash over 12 µin Pd/Ni receptacle
	25 each	2057174-1	3 µin Au flash over 12 µin Pd/Ni receptacle
	25 each	2057175-1	3 µin Au flash over 27 µin Pd/Ni receptacle
	25 each	2057176-1	3 µin Au flash over 27 µin Pd/Ni receptacle

Figure 1

1.6. Environmental Conditions

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

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

1.7. Qualification Test Sequence

A. Test Report CTL5730-115-016

Test Or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1,9	1,8	1,5	1,5	1,5
Termination resistance, dry circuit	3,7		2,4	2,4	2,4
Insulation resistance		2,6			
Dielectric withstanding voltage		3,7			
Random vibration	5				
Physical shock	6				
Connector mating force	2				
Connector unmating force	8				
Durability	4				
Thermal shock		4		3	
Humidity/temperature cycling		5			
Mixed flowing gas			3		
Temperature life					3

NOTE *(a) See paragraph 1.5.*
(b) Numbers indicate sequence in which tests are performed.

B. Test Report EA20080505T

Test Or Examination	Test Group (a)				
	1	2	3	4	7
	Test Sequence (b)				
Low Level Contact Resistance (LLCR)	1,4,6	1,4,6,8	1,4,6	1,4,6,8,10	1,3
Random vibration			5		
Durability (preconditioning)	2	2	2	2	
Durability					2
Reseating	5	7		9	
Thermal shock		3			
Humidity/temperature cycling		5			
Mixed flowing gas				5	
Temperature life (preconditioning)			3	3	
Temperature life	3				
Thermal disturbance				7	

NOTE *(a) See paragraph 4.1.A.*
(b) Numbers indicate sequence in which tests are performed.

Figure 2

2. SUMMARY OF TESTING

2.1. Test Report CTL5730-115-016

A. Examination of Product - All Test Groups

All specimens submitted for testing were selected from normal current production lots. They were inspected and accepted by the Product Assurance Depsartment of the Capital Goods Business Unit.

B. Termination Resistance, Dry Circuit - Test Groups 1, 2 and 3

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than 15 milliohms.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	400	Initial	4.63	6.13	5.276
		After mechanical	4.69	14.56	6.266
2	400	Initial	4.31	5.14	4.916
		After temperature life	5.28	10.53	5.719
3	400	Initial	4.11	5.87	4.960
		After mixed flowing gas	4.30	9.95	5.411

NOTE *All values in milliohms.*

Figure 3

C. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 5000 megohms initially and 1000 megohms after testing.

D. Dielectric Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred when a test current was applied between adjacent contacts.

E. Random Vibration - Test Group 1

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

F. Physical Shock - Test Group 1

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

G. Connector Mating Force - Test Group 1

All mating force measurements were less than 12 ounces per contact.

H. Connector Unmating Force - Test Group 1

All unmating force measurements were greater than 1.5 ounces per contact.

I. Durability - Test Group 1

No evidence of physical damage was visible as a result of mating and unmating the specimens 75 times for 15 microinches of gold plating and 150 times for 30 microinches of gold plating.

J. Thermal Shock - Test Group 4

No evidence of physical damage was visible as a result of thermal shock testing.

K. Humidity/temperature Cycling - Test Group 4

No evidence of physical damage was visible as a result of humidity/temperature cycling.

L. Mixed Flowing Gas - Test Group 3

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

M. Temperature Life - Test Group 2

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

| 2.2. Test Report EA20080505T

| A. LLCR - Test Groups 1, 2, 3, 4 and 7

| All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open
| circuit voltage were less than 15 milliohms. All wire bulk was removed from the measurements.

| B. Random Vibration - Test Group 3

| No discontinuities were detected during vibration testing. Following vibration testing, no cracks,
| breaks, or loose parts on the specimens were visible.

| C. Durability (Preconditioning) - Test Groups 1, 2, 3 and 4

| No evidence of physical damage was visible as a result of mating and unmating the specimens 20
| times at a maximum rate of 300 cycles per hour.

| D. Durability - Test Group 7

| No evidence of physical damage was visible as a result of mating and unmating the specimens 75
| times for 3 microinches of gold flash over 12 microinches of palladium/nickel plating and 150 times
| for 3 microinches of gold flash over 27 microinches of palladium/nickel plating.

| E. Reseating - Test Groups 1, 2 and 4

| No evidence of physical damage was visible as a result of mating and unmating the specimens 3
| times.

F. Thermal Shock - Test Group 2

No evidence of physical damage was visible as a result of thermal shock testing.

G. Humidity/temperature Cycling - Test Group 2

No evidence of physical damage was visible as a result of humidity/temperature cycling.

H. Mixed Flowing Gas - Test Group 4

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

I. Temperature Life (Preconditioning) - Test Groups 3 and 4

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

J. Temperature Life - Test Group 1

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

K. Thermal Disturbance - Test Group 4

No evidence of physical damage was visible as a result of thermal disturbance testing.

3. TEST METHODS

3.1. Test Report CTL5730-115-016

A. Examination of Product

Product drawings and inspection plans were used to examine the specimens. They were examined visually and functionally.

B. Termination Resistance, Dry Circuit

Termination resistance measurements at low level current were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes DC with an open circuit voltage of 50 millivolts DC.

C. Dielectric Withstanding Voltage

A test potential of 1000 volts DC was applied between adjacent contacts. This potential was applied for 1 minute and then returned to zero.

D. Insulation Resistance

Insulation resistance was measured between adjacent contacts using a test voltage of 500 volts DC. This voltage was applied for 1 minute before the resistance was measured.

E. Random Vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 and 2000 Hz. The Power Spectral Density (PSD) at 50 Hz was 0.01 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.04 G^2/Hz at 100 Hz. The spectrum was flat at 0.04 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to the upper boundary frequency of 2000 Hz at which the PSD was 0.01 G^2/Hz. The root-mean square amplitude of the excitation was 23.91 GRMS.

F. Mechanical Shock, Sawtooth

Mated specimens were subjected to a mechanical shock test having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

G. Connector Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 1 inch per minute.

H. Connector Unmating Force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of 1 inch per minute.

I. Durability

Specimens were mated and unmated at a maximum rate of 150 cycles per hour.

J. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -65 and 105°C with 1 minute transition between temperatures.

K. Humidity/temperature Cycling

Mated specimens were exposed to 10 humidity/temperature cycles. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity.

L. Mixed Flowing Gas, Class III

Mated specimens were exposed for 20 days to a mixed flowing gas Class III exposure. Class III exposure is defined as a temperature of 30°C and a relative humidity of 75% with the pollutants of Cl_2 at 20 ppb, NO_2 at 200 ppb and H_2S at 100 ppb.

M. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 500 hours.

| 3.2. Test Report EA20080505T

| A. LLCR

| LLCR measurements were made using a 4 terminal measuring technique. The test current was
| maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

B. Random Vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum was flat at 0.02 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

C. Durability (Preconditioning)

Specimens were unmated and mated 20 times at a maximum rate of 300 cycles per hour.

D. Durability

Specimens with 3 microinches of gold flash over 12 microinches of palladium/nickel plating were mated and unmated 75 times, specimens with 3 microinches of gold flash over 27 microinches of palladium/nickel plating were mated and unmated 150 times.

E. Reseating

Specimens were manually unmated and remated 3 times.

F. Thermal Shock

Specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 85°C with 1 minute transition between temperatures.

G. Humidity/temperature Cycling

Specimens were exposed to 24 humidity/temperature cycles consisting of 1 hour dwells at 25°C at 80% RH and 65°C at 50% RH.

H. Mixed Flowing Gas

Mated and unmated specimens were exposed for 14 days (unmated for the first 9 days and mated for the final 5 days) to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30°C and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb.

I. Temperature Life (Preconditioning)

Specimens were exposed to a temperature of 105°C for 168 hours.

J. Temperature Life

Specimens were exposed to a temperature of 105°C for 528 hours.

K. Thermal Disturbance

Specimens were subjected to 10 temperature cycles with each cycle consisting of 15 minute dwells at 15 and 85°C with a minimum ramp time between temperatures of 2°C per minute.