VAL-U-LOK* Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on VAL-U-LOK* Connectors to determine their conformance to the requirements of Product Specification 108-2112, Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of VAL-U-LOK connectors. Testing was performed at the Engineering Assurance Product Testing Laboratory. The test file numbers for this testing are CTL2373-014 and CTL2374-004. This documentation is on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The VAL-U-LOK connectors listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2112, Revision A.

1.4. 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
1,2,3,4,5,6	30 each	794955-1	VAL-U-LOK pins with 18 AWG wire
	5 each	1586000-6	6 position VAL-U-LOK plug
	30 each	794956-1	VAL-U-LOK socket with 18 AWG wire
	5 each	794954-6	6 position VAL-U-LOK receptacle
1	30	1586000-6	6 position VAL-U-LOK plug
	30	794954-6	6 position VAL-U-LOK receptacle
	26	794956-1	VAL-U-LOK socket with 18 AWG wire
	30	794956-1	VAL-U-LOK socket with 20 AWG wire
	30	794956-1	VAL-U-LOK socket with 22 AWG wire
	30	794958-1	VAL-U-LOK socket with 22 AWG wire
	30	794958-1	VAL-U-LOK socket with 24 AWG wire
	30	794958-1	VAL-U-LOK socket with 26 AWG wire
7	3	2-794954-4	24 position VAL-U-LOK receptacle
	3	2-794953-4	24 position VAL-U-LOK plug
	72	794955-1	VAL-U-LOK pins with 18 AWG wire
	72	794955-3	VAL-U-LOK pins with 18 AWG wire
	72	794956-1	VAL-U-LOK socket with 18 AWG wire
	72	794956-3	VAL-U-LOK socket with 18 AWG wire

Figure 1

* Trademark
| Indicates change

1.5. Environmental Conditions

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

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

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Initial examination of product	1	1	1	1	1	1	1
Low Level Contact Resistance (LLCR)		2,4	2,4		2,5	2,4,6,8,10	2,4
Insulation resistance				2,5			
Withstanding voltage				3,6			
Temperature rise vs current							5
Sinusoidal vibration					3		3
Mechanical shock					4		
Durability						3	
Crimp pull-out force	6						
Locking force	3						
Unlocking force	4						
Terminal insertion	2						
Terminal retention	5						
Thermal shock						7	
Humidity, steady state				4			
Heat resistance						5	
Cold resistance						9	
Salt spray		3					
SO_2 gas			3				
Final examination of product	7	5	5	7	6	11	6

NOTE *(a) See paragraph 1.4.*
(b) Numbers indicate sequence in which tests are performed.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product

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

2.2. LLCR

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 10 milliohms initially and after testing.

2.3. Insulation Resistance

All insulation resistance measurements were greater than 1000 megohms.

2.4. Withstanding Voltage

No dielectric breakdown or flashover occurred.

2.5. Temperature Rise vs Current

All specimens had a temperature rise of less than 30˚C above ambient when tested using a baseline rated current of 10.5 amperes for brass pins and 10.25 amperes for phosphor bronze pins.

2.6. Sinusoidal Vibration

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

2.7. Mechanical Shock

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

2.8. Durability

No physical damage occurred as a result of mating and unmating the specimens 30 times for specimens with H-06 hardness, and 50 times for specimens with H-04 hardness.

2.9. Crimp Pull-Out Force

All crimp pull-out measurements were greater than 88 N for 18 AWG wire, 59 N for 20 AWG wire, 39 N for 22 AWG wire, 29 N for 24 AWG wire, and 20 N for 26 AWG wire.

2.10. Locking Force

All locking force measurements were less than 41.2 N for 6 position specimens.

2.11. Unlocking Force

All unlocking force measurements were greater than 2.4 N for 6 position specimens.

2.12. Terminal Insertion

All terminal insertion force measurements were less than 15 N.

2.13. Terminal Retention

All terminal retention force measurements were greater than 30 N.

2.14. Thermal Shock

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

2.15. Humidity, Steady State

No evidence of physical damage was visible as a result of exposure to steady state humidity.

2.16. Heat Resistance

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

2.17. Cold Resistance

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

2.18. Salt Spray

No evidence of physical damage was visible as a result of exposure to a salt saturated atmosphere.

2.19. SO_2 Gas

No evidence of physical damage was visible as a result of exposure to an SO_2 atmosphere.

2.20. Final Examination of Product

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

3. TEST METHODS

3.1. Initial Examination of Product

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

3.2. 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.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Withstanding Voltage

A test potential of 1500 volts AC was applied between adjacent contacts. This potential was applied for 1 minute and then returned to zero.

3.5. Temperature Rise vs Current

Temperature rise curves were produced by measuring individual contact temperatures at 5 different current levels. These measurements were plotted to produce a temperature rise vs current curve. Thermocouples were attached to individual contacts to measure their temperatures. 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.

3.6. Sinusoidal Vibration

Mated specimens were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 1.5 mm double amplitude. The vibration frequency was varied uniformly between the limits of 10 and 55 Hz and returned to 10 Hz in 1 minute. This cycle was performed 120 times in each of 3 mutually perpendicular planes for a total vibration time of 6 hours. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Mechanical Shock

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 50 gravity units (g peak) and a duration of 11 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.

3.8. Durability

Specimens with H-06 hardness were mated and unmated 30 times while specimens with H-04 hardness were mated and unmated 50 times at a maximum rate of 10 cycles per minute.

3.9. Crimp Pull-Out Force

The force load was applied to each specimen using a tensile/compression device with the rate of travel at 12.7 mm per minute.

3.10. Locking Force

The force required to mate individual specimens was measured using a tensile/compression device with the rate of travel at 12.7 mm per minute.

3.11. Unlocking Force

The force required to unmate individual specimens was measured using a tensile/compression device with the rate of travel at 12.7 mm per minute.

3.12. Terminal Insertion

Terminal insertion force was measured by applying an increasing force to each terminal using a tensile/compression device with the rate of travel at 12.7 mm per minute until the terminal was properly seated in the housing.

3.13. Terminal Retention

Terminal retention force was measured by applying an increasing force to each terminal using a tensile/compression device with the rate of travel at 12.7 mm per minute until the terminal was removed from the housing.

3.14. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105˚C. The transition between temperatures was less than 1 minute.

3.15 Humidity, Steady State

Specimens were subjected to a relative humidity of 90 to 95% and a temperature of 40˚C for a period of 96 hours.

3.16. Heat Resistance

Mated specimens were exposed to a temperature of 105˚C for 96 hours.

3.17. Cold resistance.

Mated specimens were exposed to a temperature of -40˚C for 96 hours.

3.18. Salt Spray

Mated specimens were subjected to a 5% salt spray at a temperature of 35˚C for 48 hours.

3.19. SO_2 Gas

Mated specimens were subjected to 50 ppm of SO_2 gas at a temperature of 40˚C for 24 hours.

3.20. Final Examination of Product

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