NETCONNECT* SL Series Jacks and Category 6 Plugs

1. INTRODUCTION

1.1. Purpose

Testing was performed on NETCONNECT* SL Series Jacks and Category 6 Plugs to determine their conformance to the requirements of Product Specification 108-1990 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of NETCONNECT SL Series Jacks and Category 6 Plugs. Testing was performed at the Engineering Assurance Product Testing Laboratory between 01Oct01 and 01Nov02.

1.3. Conclusion

The NETCONNECT SL Series Jacks and Category 6 Plugs listed in paragraph 1.5 conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1990 Revision A.

1.4. Product Description

These assemblies are designed for installation into various outlet plates, surface mount boxes, panels, and other similar type fittings. Jacks incorporate IDC terminals for terminating both shielded or unshielded twisted pair communications cable. Jacks will accommodate 22 - 24 AWG solid and 24-26 AWG stranded conductors. The maximum conductor insulation diameter is 1.45 mm [.057 in]. For large OD conductors 1.27 to 1.45 mm an external strain relief must be used. The plugs accommodate Category 6 cable and shielded or unshielded twisted pair cable with 23 - 24 AWG solid, or 24 - 26 AWG stranded conductors. The maximum conductor insulation diameter is 1.00 mm [.039 in] with a cable jacket diameter between 4.7 and 7.0 mm [.185 and .276 in].

1.5. Test Specimens

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

Part Number	Description	Test Group																					Total
		1	2	3	4	5	6a	6b	6c	7a	7b	7c	8a	8b	8c	9a	9b	9c	10a	10b	10c	11	
1375191	Category 5e jack	5	5	5	5	5	5	5		5	5		5	5		5	5		5	5			75
1375192	Category 3 jack								5			5			5			5			5		25
1375188	Shielded Category 6																					5	5
1375202	Category 6 plug	5	5	5	5	5	5			5			5			5			5				50
558530	HP plug							5			5			5			5			5			25
641337	6 position plug								5			5			5			5			5		25
1375202	Shielded plug																					5	5

Figure 1

* Trademark
| Indicates change

1.6 Environmental Conditions

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

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

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (b)										
Examination of product	1,5	1,7	1,8	1,4	1,5	1,5	1,5	1,6	1,5	1,8	1,5
Contact resistance	2,4	2,6	2,7		2,4	2,4		2,5		2,7	
Insulation resistance			3,6								
Voltage proof									2,4		
Vibration, jack-plug and IDC-wire interface										3	
Mechanical shock, jack-plug interface						3				4	
Durability, jack-plug interface (6 position plug)								3			
Durability, jack-plug interface								4			
Plug insertion force, jack-plug interface							2				2
Plug withdrawal force, jack-plug interface							3				3
Plug retention in jack, jack-plug interface							4				
Termination tensile strength, horizontal, IDC-wire interface				2							
Termination tensile strength, vertical, IDC-wire interface				3							
Durability, repeated, IDC-wire interface		3(c)									
Thermal shock, IDC-wire interface		4	4								
Thermal shock, jack-plug interface										5	
Humidity/temperature cycling, IDC-wire interface		5	5								
Humidity, steady state, jack-plug interface									3	6	4
Stress relaxation, IDC-wire interface	3										
Mixed flowing gas, jack-plug interface					3(d)						

NOTE

(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Perform 100 cycles (terminations) on jack IDC's before thermal shock, 33 additional cycles (terminations) on jack IDC's after 50 temperature cycles of thermal shock, 33 cycles (terminations) on jack IDC's after 7 days of humidity/temperature cycling, and 34 cycles (terminations) after 21 days of humidity/temperature cycling.
(d) Precondition jack interface with 40 durability cycles.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

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

2.2. Contact Resistance - Test Groups 1, 2, 3, 5, 6, 8 and 10

All termination resistance measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 20 milliohms ΔR after testing.

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 500 megohms minimum.

2.4. Voltage Proof - Test Group 9

No dielectric breakdown or flashover occurred.

2.5. Vibration - Test Group 10

No discontinuities greater than 1 microsecond were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts were visible on the specimens.

2.6. Mechanical Shock - Test Groups 6 and 10

No discontinuities greater than 1 microsecond were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.7. Durability, Jack-plug Interface (6 position plug) - Test Group 8

No physical damage occurred to the specimens as a result of mating and unmating the specimens 200 times.

2.8. Durability, Jack-plug Interface - Test Group 8

No physical damage occurred to the specimens as a result of mating and unmating the specimens 750 times.

2.9. Plug Insertion Force, Jack-plug Interface - Test Groups 7 and 11

All insertion forces were less than 5 pounds for unshielded and 8 pounds for shielded specimens.

2.10. Plug Withdrawal Force, Jack-plug Interface - Test Group 7 and 11

All withdrawal forces were less than 5 pounds for unshielded and 8 pounds for shielded specimens.

2.11. Plug Retention in Jack, Jack-plug Interface - Test Group 7

All contacts withstood a force of 20 pounds for 5 seconds without dislodging from the housing.

2.12. Termination Tensile Strength, Horizontal - Test Group 4

All tensile values were greater than 14.0 pounds for 22 AWG solid wire, 12.0 pounds for 23 AWG solid wire, 9.5 pounds for 24 AWG solid wire, 7.5 pounds for 24 AWG stranded wire and 4.6 pounds for 26 AWG stranded wire.

2.13. Termination Tensile Strength, Vertical - Test Group 4

All tensile values were greater than 1.5 pounds for 22 AWG solid wire, 1.0 pound for 23 AWG solid wire, 1.0 pound for 24 AWG solid wire, 1.5 pounds for 24 AWG stranded wire and 1.9 pounds for 26 AWG stranded wire.

2.14. Durability, Repeated, IDC-wire Interface - Test Group 2

No physical damage occurred to the specimens as a result of terminating and re-terminating the specimens 200 times.

2.15. Thermal Shock, IDC-wire Interface - Test Groups 2 and 3

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

2.16. Thermal Shock, Jack-plug Interface - Test Group 10

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

2.17. Humidity/Temperature Cycling, IDC-wire Interface - Test Groups 2 and 3

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

2.18. Humidity, Steady State, Jack-plug Interface - Test Groups 9, 10 and 11

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

2.19. Stress Relaxation, IDC-wire Interface - Test Group 1

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

2.20. Mixed Flowing Gas - Test Group 5

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

2.21. 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

A Certification of Conformance was issued stating that all specimens in this test package have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts.

3.2. Contact Resistance

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 3). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

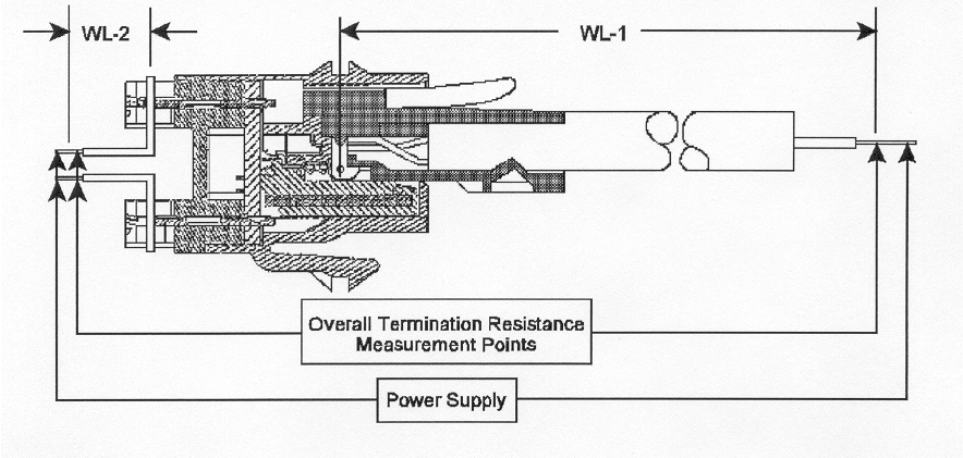

Figure 3
Typical Termination Resistance Measurement Points

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated specimens. A test voltage of 100 volts DC was applied for 1 minute before the resistance was measured.

3.4. Voltage Proof

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

3.5. Vibration, Jack-plug Interface and IDC-wire Interface

The specimens were subjected to a simple harmonic motion having amplitude of 0.028 inch double amplitude (maximum total excursion). The vibration frequency was varied uniformly between the approximate limits of 10 to 55 Hz. The entire frequency range of 10 to 55 Hz and return to 10 Hz was repeated 5 times and traversed at a rate of 1 octave per minute. The motion was applied in each of the 3 mutually perpendicular axes. The test specimens were rigidly mounted to the vibrating surface while the cable ends were not secured to any support (cables were to short to support). The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

3.6. Mechanical Shock, Jack-plug Interface

The parameters of this test condition are a half-sine waveform with an acceleration amplitude of 30 gravity units (g's peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular axes of the test specimen, for a total of 18 shocks. The test specimens were rigidly mounted to the shock surface while the cable ends were not secured to any support (cables were to short to support). The test specimens were monitored for discontinuities of 1 microsecond or greater using an energizing current of 100 milliamperes.

3.7. Durability, Jack-plug Interface (6 position plug)

Specimens were mated and unmated for 200 cycles at a maximum rate of 500 cycles per hour.

3.8. Durability, jack-plug Interface

Specimens were mated and unmated for 750 cycles at a maximum rate of 500 cycles per hour.

3.9. Plug Insertion Force, Jack-plug Interface

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 .5 inch per minute.

3.10. Plug Withdrawal Force, Jack-plug Interface

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 .5 inch per minute.

3.11. Plug Retention in Jack, Jack-plug Interface

An axial load of 20 pounds was applied to mated connector assemblies in a direction that would cause the connector lacking latches to disengage.

3.12. Termination Tensile Strength, Horizontal

The force load was applied to each specimen using a tensile/compression device with the rate of travel at .5 inch per minute.

3.13. Termination Tensile Strength, Vertical

The force load was applied to each specimen using a tensile/compression device with the rate of travel at .5 inch per minute.

3.14. Durability, Repeated, IDC-wire Interface

Wires were terminated and re-terminated on jack's IDC for 200 cycles using impact tool part number 1375308-1 set on low impact setting.

3.15. Thermal Shock, IDC-wire Interface

Mated specimens were subjected to 100 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 70˚C. The transition between temperatures was an average of 3 minutes.

3.16. Thermal Shock, Jack-plug Interface

Mated specimens were subjected to 25 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 70˚C. The transition between temperatures was less than 1 minute.

3.17. Humidity/Temperature Cycling, IDC-wire Interface

Mated specimens were exposed to 21 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. During 5 of the first 7 cycles, the specimens were exposed to a cold shock at -10˚C for 3 hours (Figure 4).

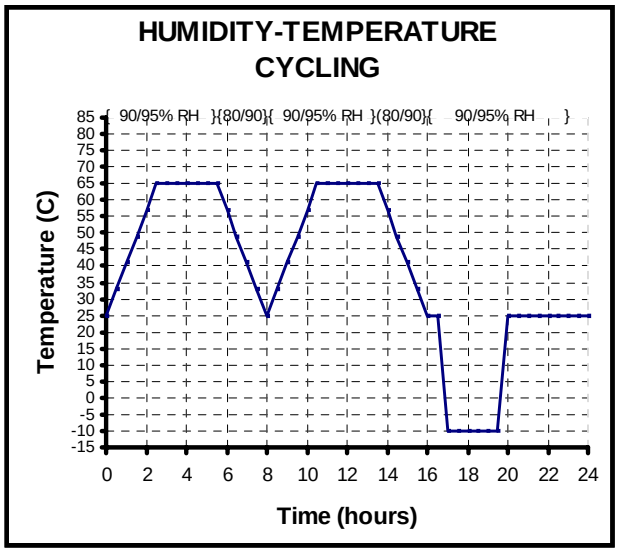

Figure 4
Typical Humidity/Temperature Cycling Profile

3.18. Humidity, Steady State, Jack-plug Interface

Mated specimens were subjected to a relative humidity of 95% and a temperature of 55˚C for a period of 10 days.

3.19. Stress Relaxation, IDC-wire Interface

Mated specimens were exposed to a temperature of 70˚C for 500 hours.

3.20. Mixed Flowing Gas, Jack-plug Interface

Mated specimens were exposed for 4 days to a mixed flowing gas IEC 68-2-60, 1995-12, Method 2 exposure. 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, and H_2S at 10 ppb. Specimens were preconditioned with 40 cycles of durability.

3.21. Final Examination of Product

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