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**NETCONNECT\* SL Series Jacks and Category 6 Plugs**

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**1. SCOPE**

## 1.1. Content

This specification covers performance, test and quality requirements for NETCONNECT\* Category 3, Category 5e and Category 6 SL Series unshielded 110 jacks, Category 5e and Category 6 SL Series shielded 110 jacks and plugs. 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].

## 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

## 1.3. Successful qualification testing on the subject product line was completed on 01Nov02. The Qualification Test Report number for this testing is 501-553. This documentation is on file at and available from Engineering Practices and Standards (EPS).

**2. APPLICABLE DOCUMENTS**

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

## 2.1. TE Connectivity (TE) Document

501-553: Qualification Test Report (NETCONNECT\* SL Series Jacks and Category 6 Plugs)

## 2.2. Industrial Standards

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC 60068: Basic Environmental Testing Procedures
- IEC 60512: Electromechanical Components For Electronic Equipment; Basic Testing Procedures and Measuring Methods Part 1: General
- TIA/EIA-568-B.2: Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components
- TIA-968-A: Telecommunications, Telephone Terminal Equipment, Technical Requirements for Connection of Terminal Equipment to the Telephone Network

2.3. Reference Documents

- 108-1990-1: Product Specification (NETCONNECT\* SL Series Category 3 Jacks)
- 108-1990-2: Product Specification (NETCONNECT\* SL Series Category 5e Jacks)
- 108-1990-3: Product Specification (NETCONNECT\* SL Series Category 6 Jacks)
- 109-197: Test Specification (TE Test Specifications vs EIA and IEC Test Methods)
- 114-6016: Application Specification (Modular Plug Connectors (Standard and Small Conductors))
- 114-6053: Application Specification (High Performance Modular Plug Connectors)
- 114-13035: Application Specification (8 Position Category 6 Modular Plug Connectors)
- 114-93006: Application Specification (8-Position Category 6 Shielded Modular Plug Connector)
- 408-8417: Instruction Sheet (SL Series 110 Connect Modular Jacks)
- 408-8602: Instruction Sheet (Shielded SL Series 110 Connect Modular Jacks)

**3. REQUIREMENTS**

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable customer drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable customer drawing.

3.3. Ratings

- Voltage: 150 volts AC maximum
- Temperature: -40 to 70°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing.	Visual, dimensional and functional per applicable quality inspection plan.
<b>ELECTRICAL</b>		
Contact resistance.	$\Delta R$ 20 milliohms maximum.	IEC 60512-2-1. Subject mated plug and terminated jack to 20 millivolts maximum open circuit voltage at 100 milliamperes maximum. See Figure 3.
Insulation resistance.	500 megohms minimum.	IEC 60512-3-1. Test voltage of 100 volts DC with 1 minute hold. Test between adjacent contacts of mated plug and terminated jack.

Figure 1 (continued)

Test Description	Requirement	Procedure
Voltage proof.	One minute hold with no breakdown or flashover.	IEC 60512-4-1. 1000 volts AC at sea level. Test between adjacent contacts of mated plug and jack.
<b>MECHANICAL</b>		
Vibration, jack-plug interface and IDC-wire interface.	No discontinuities of 1 microsecond maximum. Shall remain mated and show no evidence of physical damage. See Note.	IEC 60512-6-4. Subject mated plug and terminated jack to frequency range of 10 to 55 Hz with displacement amplitude of .014 inch. Sweep cycles per direction shall be 5 in each direction of 3 axis which are mutually perpendicular planes.
Mechanical shock, jack-plug interface.	No discontinuities of 5 microseconds maximum. See Note.	IEC 60512-6-3. Subject mated plug and terminated jack to 30 G's half-sine shock wave of 11 milliseconds duration. Three shocks in each direction (2 total) applied along 3 mutually perpendicular planes (3 axis), 18 total shocks.
Durability, jack-plug interface using a 6 position plug.	Permanent deflection of contacts in positions 1 and 8 are acceptable if the specimens meet the requirements of additional tests. See Note.	IEC 60512-9-1. Mate and unmate plug and jack interface with latch inoperative for 200 cycles with a 6 position plug at a maximum rate of 500 (automatic) or 300 (manual) cycles per hour.
Durability, jack-plug interface.	See Note.	IEC 60512-9-1. Mate and unmate plug and jack interface with latch inoperative for 750 cycles at a maximum rate of 500 (automatic) or 300 (manual) cycles per hour.
Plug insertion force, jack-plug interface.	5 pounds maximum, unshielded. 8 pounds maximum, shielded.	IEC 60512-13-1. Measure force required to mate plug and jack with latch depressed at a maximum rate of .5 inch per minute.
Plug withdrawal force, jack-plug interface.	5 pounds maximum, unshielded. 8 pounds maximum, shielded.	IEC 60512-13-1. Measure force required to unmate plug and jack with latch depressed at a maximum rate of .5 inch per minute.
Plug retention in jack, jack-plug interface.	Plug shall not dislodge from jack.	EIA 364-98. Apply an axial load of 20 pounds to plug housing at a rate of .5 inch per minute with plug mated in jack and latch engaged. Maintain load for 5 seconds.

Figure 1 (continued)

Test Description	Requirement	Procedure														
Termination tensile strength, horizontal, IDC-wire interface.	<table border="1"> <thead> <tr> <th>Wire Size</th> <th>Pounds</th> </tr> <tr> <th>AWG</th> <th>Minimum</th> </tr> </thead> <tbody> <tr> <td>22 Solid</td> <td>14</td> </tr> <tr> <td>23 Solid</td> <td>12</td> </tr> <tr> <td>24 Solid</td> <td>9.5</td> </tr> <tr> <td>24 Stranded</td> <td>7.5</td> </tr> <tr> <td>26 Stranded</td> <td>4.6</td> </tr> </tbody> </table>	Wire Size	Pounds	AWG	Minimum	22 Solid	14	23 Solid	12	24 Solid	9.5	24 Stranded	7.5	26 Stranded	4.6	EIA 364-8. Determine slot tensile strength. Pull parallel to terminated wire. See Figure 4.
Wire Size	Pounds															
AWG	Minimum															
22 Solid	14															
23 Solid	12															
24 Solid	9.5															
24 Stranded	7.5															
26 Stranded	4.6															
Termination tensile strength, vertical, IDC-wire interface.	<table border="1"> <thead> <tr> <th>Wire Size</th> <th>Pounds</th> </tr> <tr> <th>AWG</th> <th>Minimum</th> </tr> </thead> <tbody> <tr> <td>22 Solid</td> <td>1.5</td> </tr> <tr> <td>23 Solid</td> <td>1</td> </tr> <tr> <td>24 Solid</td> <td>1</td> </tr> <tr> <td>24 Stranded</td> <td>1.5</td> </tr> <tr> <td>26 Stranded</td> <td>1.9</td> </tr> </tbody> </table>	Wire Size	Pounds	AWG	Minimum	22 Solid	1.5	23 Solid	1	24 Solid	1	24 Stranded	1.5	26 Stranded	1.9	EIA 364-8. Determine slot tensile strength. Pull perpendicular to terminated wire. See Figure 5.
Wire Size	Pounds															
AWG	Minimum															
22 Solid	1.5															
23 Solid	1															
24 Solid	1															
24 Stranded	1.5															
26 Stranded	1.9															
Durability repeated, IDC-wire interface.	See Note.	TIA/EIA 568-B.2. Terminate and re-terminate IDC's on jack for 200 cycles with 22 AWG solid wire using impact tool PN 569994-1 set on low impact setting.														
<b>ENVIRONMENTAL</b>																
Thermal shock, IDC-wire interface.	See Note.	IEC 60068-2-14. Subject mated plug and terminated jack to 100 cycles between -40 and 70°C. Duration exposure shall be 30 minutes with an average transition rate of 3°C per minute.														
Thermal shock, jack-plug interface.	See Note.	IEC 60512-11-9. Subject mated plug and terminated jack to 25 cycles between -40 and 70°C.														
Humidity/temperature cycling, IDC-wire interface.	See Note.	IEC 60068-2-38. Subject mated plug and terminated jack to 21 cycles (cycle time 24 hours) between 25 and 65°C at 93% RH with a -10°C sub-cycle shock.														
Humidity, steady state, jack-plug interface.	See Note.	IEC 60512-11-12. Subject mated plug and terminated jack to 55°C and 95% RH for 10 days.														
Stress relaxation, IDC-wire interface.	See Note.	IEC 60068-2-2, Test Method Ba. Subject mated plug and terminated jack to 70°C for 500 hours.														

Figure 1 (continued)

Test Description	Requirement	Procedure
Mixed flowing gas, jack-plug interface.	See Note.	IEC 60512-11-7, Method 2. Subject mated plug and terminated jack to exposure for 4 days.

**NOTE** *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification 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 4.1.A.  
 (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

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#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1. Qualification Testing

###### A. Specimen Selection

Plugs and jacks shall be prepared in accordance with applicable Instruction Sheet and shall be selected at random from current production. Test groups 1, 2, 3, 4 and 5 shall each consist of 5 specimens (plug and jack). If not specified, Category 6 plugs shall be used. Test groups 6, 7, 8, 9 and 10 shall each consist of 5 specimens of each of the following subgroups: 1) SL Category 5e or Category 6 jack and Category 6 plug; 2) SL Category 5e or Category 6 jack and high performance plug; 3) SL Category 3 jack and 6 position plug. Test group 8, 6 position plug shall have no coring where pins 1 and 8 are located in receiving jack, as shown in TIA-968-A Figure 6.3. Test group 11 shall consist of 5 specimens of shielded jacks and plugs.

###### B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

##### 4.2. Requalification Testing

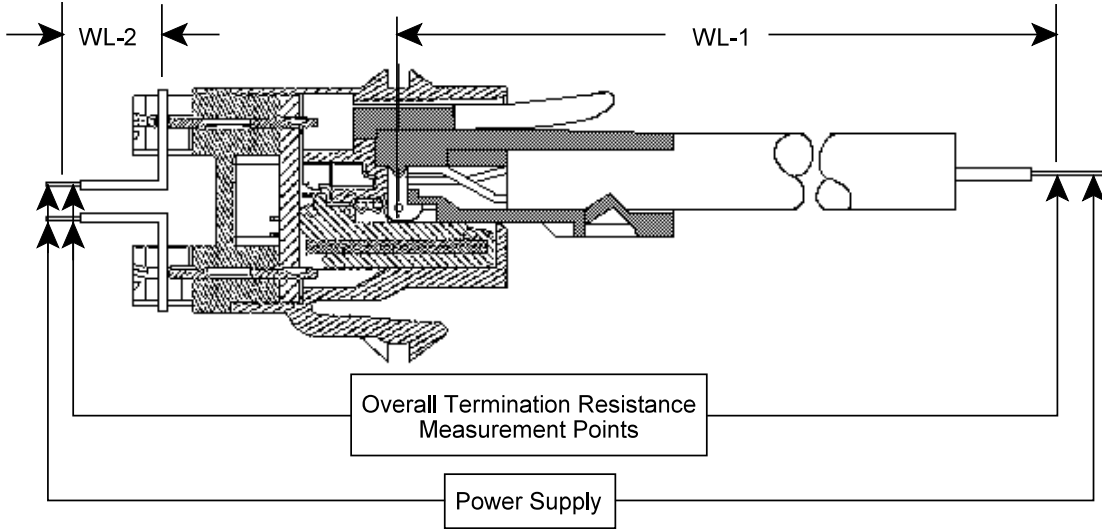
If changes significantly affecting form, fit or function are made to the product or manufacturing process or controlling industry specification, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

##### 4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

##### 4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.



**NOTE**

- (a) Termination resistance of this assembly consists of plug to jack contact resistance plus printed circuit board trace plus IDC terminal to discrete wire contact resistance. Printed circuit board trace length varies with each jack position, therefore, significant variations in termination resistance readings can be expected within each jack assembly.
- (b) Millivolt drop (resistance) due to wire lengths shall be subtracted from all readings.

Figure 3  
Overall Termination Resistance Measurement Points

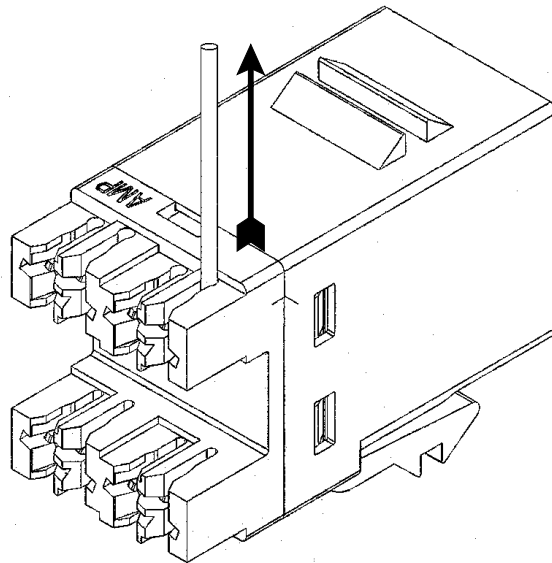


Figure 4  
Termination Tensile Strength Horizontal Pull

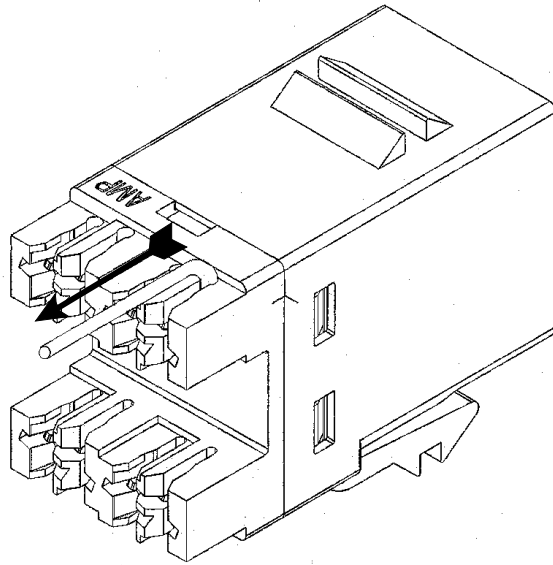


Figure 5  
Termination Tensile Strength Vertical Pull