

AMP-TWIST 6_AS SL JACK

1. SCOPE

1.1 Content

This specification covers performance, tests and quality requirements for AMP NETCONNECT*, **AMP-TWIST* 6_AS SL JACK** used to provide an universal connection interface between premise wiring of an office and the user's network of communications equipment (for data and voice networking systems).

These assemblies are designed for installation into various outlet plates, surface mount boxes, panels and other similar type fittings. Jacks incorporate IDC terminal for terminating both shielded and unshielded twisted pair communications cable. Jacks will accommodate:

Solid conductor cable range (AWG)	Stranded conductor cable range (AWG)	Max. conductor insulation diameter	Cable diameter range
22-24	24	1.60 mm	5.0- 9.0 mm

1.2 Qualification

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

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 Tyco Electronics Documents.

Document	AMP-TWIST 6 _A S SL Jack
Product Spec.	108-93028
Instruction sheet	411-93016
Application spec.	114-93016
Customer drawing (Straight cable exit with and w/o dust cover)	C-1711592, C-1711716
Qualification Test report	501-93025

Other applicable documents:

- 109-197: Tyco Electronics AMP Test Specification vs. EIA and IEC Test Methods.
- 230-702: Supplier requirements for elimination of hazardous substances.

2.2 Industrial Standards

Standard	Title description
ISO/IEC 11801. Ed. 2.0 Amd. 2 April 2009	<i>Information Technology - Generic Cabling for Customer Premises.</i>
ANSI/TIA-568-B.2-10. April 2008	Transmission Performance Specifications for 4-Pair 100 Ohm Augmented Category 6 Cabling.
DIN IEC 60512 (all parts)	<i>Basic testing procedures and measuring methods for electromechanical components for electronic equipment. Test Specifications as indicated in Fig. 1</i>
DIN IEC 60068	<i>Basic environmental testing procedures. Test Spec. as indicated in Fig.1.</i>
ISO / IEC 60603-7-1 First Edition. 2002-01	<i>Detail Specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality</i>
IEC 60603-7-5. First Edition 2007-03	<i>Detail Specification for 8-way, shielded free and fixed connectors, for data transmissions with frequencies up to 250 MHz.</i>
IEC 60603-7-51. Ed. 1.0	<i>Connectors for Electrical Equipment. Part 7-51: Detail specification for 8-way, shielded free and fixed connectors, for data transmissions with frequencies up to 500 MHz.</i>
EIA-364	<i>Electrical Connector/Socket test Procedures Including Environmental Classifications.</i>
CENELEC EN 50289-1-14	Specification for test methods- Part 1-14- Electrical test methods- Coupling attenuation or screening attenuation of connecting hardware.

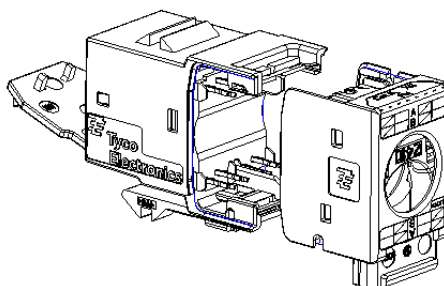
2.3 Other documents:

- **P2060a-09-D (May 2009):** GHMT External Lab. Certification according to Cat. 6_A Connecting Hardware performance.
- **R040905 (Feb. 2009):** Durability under current load.
- **PR026-01 (July 2008).** Qualification test for Cat. 6_A for vertical series (Temp. rise vs current, thermal shock, temp./humidity test, RJ 11 compatibility, rotational and vibration test).
- **CTL2965-002A (August 2001):** Low level resistance and IDC durability (AWG 24/Stranded).
- **1990309 ACL (March 1999):** Tool-less modular Jack PN 1116604-9: Qualification test report according to Design Objectives 108-1916 and AWG 23, 24/Solid cable.

3. REQUIREMENTS

3.1 Design and Construction

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



3.2 Materials

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

3.3 Wire range

- A. Conductor range (Ø mm): 0.51 - 0.65
- B. Solid conductor range: 24 - 22 AWG
- C. Stranded conductor range: 24 AWG
- D. Insulation range (Ø mm): 0.8 - 1.60
- E. Cable diameter range (Ø mm): 5.0 - 9.0

3.4 Ratings

- A. Voltage: 150 Vac max.
- B. Current: Signal application only (0.75 A)
- C. Temperature: -40°C to +85° C

3.5 Tooling

Connector has to be terminated with SL Series Jack tool PN 1725150-3 (tool kit).

For terminating AMP-TWIST 6AS SL JACK, spacer PN 1711707-1 must be used together with SL Series Jack tool. Refer to related Instruction sheet.

3.6 Performance and Test Description

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

3.7. Test Requirements and Procedures Summary

All figures related with test procedures are included in Annex A of this document.

Test Description	Requirement	Procedure
Examination of product	There shall be no defects that would impair normal operation. The dimensions shall comply with those specified in the detail specification.	Visual, dimensional and functional per applicable quality inspection plan
ELECTRICAL (See note)		
Input to output d.c Signal Contact Resistance	ISO/IEC 11801. 2 nd Ed. 200 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Mated connectors. See figure 4.
Input to output d.c Shield Contact Resistance	IEC 60603-7-5. 1 st Ed. 100 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Mated connectors. See figure 4.
Contact Resistance between separable fixed and free connectors	IEC 60603-7-5. 1 st Ed. Signal contacts: 20mΩ maximum Shield contacts: 20mΩ maximum ΔR = 20 mΩ	IEC 60512-2, Test 2a. Mated connectors.

Input to output Unbalance	Resistance	ISO/IEC 11801. 2 nd Ed. 50 mΩ maximum	IEC 60512-2-1 Test 2a. Mated connectors.
Current carrying capacity		ISO/IEC 11801. 2 nd Ed. 0.75 A	IEC 60512-3, Test 5b See Figure 5.
Insulation resistance		ISO/IEC 11801. 2 nd Ed. 500 MΩ minimum	IEC 60512-2, Test 3a, Method A, 100 V +/- 15 V d.c . Mated connectors.
Voltage proof		ISO/IEC 11801. 2 nd Ed. 1 minute hold with no breakdown or flashover. Contact to contact: 1000 V d.c or ac peak. All contacts to Shield: 1500 V d.c or ac peak.	IEC 60512-2, test 4a Mated connectors.
Surge Test		ITU-T K.20. Mated connectors Table 2a/2b, Basic Test level. Tests 2.1.1a, 2.1.1b, 2.1.3, 2.2.1a and 2.3.1a	Test 2.1 and 2.2: Acceptance criteria A per ITU-T K.44, Clause 9. Test 2.3 : Acceptance criteria B per ITU-T K.44, Clause 9.
Gauging continuity		Contact disturbance. All signal contacts and screen/specimens. 10 μs maximum.	IEC 60603-7-5. Annex A.

**TRANSMISSION
(See Note)**

	Cat. 6_A Limit (Connecting Hardware)	
NEXT (Near end Crosstalk) Loss (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-25-1 and -27-100
Insertion loss (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-25-2 and -27-100
Return loss (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-25-5 and -27-100
FEXT (Far end Crosstalk) Loss (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-25-1 and -27-100
TCL (Transverse conversion loss)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-27-100
TCTL (Transverse conversion transfer loss)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-27-100
Transfer Impedance (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60512-27-100
Coupling Attenuation (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	CENELEC 50289-1-14
PS ANEXT (Power Sum Alien Near end Crosstalk) (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0 IEC 60512-25-9

PS AFEXT (Power Sum Alien Far end Crosstalk) (Conn Hdw conf.)	ISO 11801. Ed. 2.0 Amd. 2 Cat. 6 _A	IEC 60603-7-51. Ed. 1.0
Class E_A Limit (Permanent Link)		
NEXT (Near end Crosstalk) Loss (Link conf.)	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
PS NEXT (Power Sum Near end Crosstalk) Loss. (Link conf.)	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
Insertion Loss (Link conf.)	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
Return Loss (Link conf.)	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
FEXT (Far end Crosstalk) Loss (Link conf.)	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
PS FEXT (Power Sum Far end Crosstalk) Lost (Link conf.).	ISO 11801. Ed. 2.0 Amd. 2 Class E _A	IEC 61935-1
MECHANICAL		
Vibration, Jack-plug interface and IDC-wire interface	No discontinuities > 10 microseconds. Shall remain mated and show no evidence of physical damage. IEC 60603-7-5 (point 7.3, for locking procedure and sample preparation: Cable length > 20.3 mm.). See note.	IEC 60512-6-4. Subject mated plug and terminate jack to: <ul style="list-style-type: none"> • Frequency range: 10 to 500 Hz. • Displacement amplitude (peak/peak): 0.70 mm. • Acceleration: 5g (50 m/s²). • Sweep cycles per direction shall be 10 in each direction of axis which are mutually perpendicular planes.
Durability, Jack-plug interface	See note.	IEC 60512-9-1. Mate and un-mate plug and jack interface with locking device inoperative. Speed 10 mm/s. Rest 1 second (when mated and when unmated). 750 cycles.
Plug insertion force, Jack-plug interface	30 Nw maximum, (shielded)	IEC 60512-1, Test 13b. Measure force required to mate plug and jack with latch depressed at a maximum rate of 25 mm/min.
Plug withdrawal force, Jack-plug interface	30 Nw maximum, (shielded)	IEC 60512-1, Test 13b. Measure force required to unmate plug and jack with latch depressed at a maximum rate of 25 mm/min.
Plug retention in jack, Jack-plug interface (Effectiveness of connector coupling device)	Plug shall not dislodge from jack, and shall maintain electrical continuity.	IEC 60512-8, test 15f. Mated connectors. All types: 50 N for 60 seconds ± 5 seconds. Rate of load application: 44.5 N/s Maximum.

Mechanical gauging	Passing Go/No Go Test	IEC 60603-7-5. Annex L.
Panel housing retention	90 Nw minimum	AMP-Spec. 109-49. (Source AMP Spec.108-1389). Measure panel retention force at a rate of 12'5 mm/min., using nominal panel cut-out dimensions as specified in appropriate Tyco Electronics customer drawing.
ENVIRONMENTAL		
Thermal shock. (Rapid Change of temperature). Jack-plug interface and IDC-wire interface	See note	IEC 60068-2-14 Subject mated plug and terminated jack to 25 cycles between -40° and 70°C. Duration exposure shall be 30 minutes. Recovery time: 2 hours.
Humidity-temperature cycling. (Cyclic damp heat). Jack-plug interface and 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. Half of samples in mated state. Half of samples in unmated state.
Stress relaxation. (Dry heat). Jack-plug interface and IDC-wire interface	See note	IEC 60068-2-2, Test method Ba. Subject mated plug and terminated jack to 70° C for 500 hours. (Half samples connected to 0.5A and other samples not connected).
Flowing mixed gas corrosion. Jack-plug interface and IDC-wire interface	See Note	IEC 60068-2-60 Test Method C. Test Conditions: SO ₂ 0,5 ppm (Volume) H ₂ S 0,1 ppm (Volume) T= (25 ± 2)°C HR= (75 ± 3) % Test time: 4 days. Half of samples in mated state. Half of samples in unmated state.

Figure 1 (end)

NOTE

Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 2.

NOTE

IEC 60603-7-5. 1st Edition will be superseded by IEC 60603-7-51 (Applicable for Cat. 6_A Connecting Hardware performance).

3.8. Product Qualification and Re-qualification Test Sequence (d).

	Test Group (a)							
	1 AP	2 BP	3 CP	4 DP	5 EP	6FP	7GP	8
	Test Sequence (b)							
Examination of product	1,14,21	1,15	1,10	1,9	1,14	1,8	1,6	1
ELECTRICAL								
Input-output Resistance					10			
Contact resistance	2,11,16	2,8,11	2,7	2,10	2	2	2,7	
Shield Contact resistance	3,12,17	3,9,12	3,8	3,11	3	3	3,8	
Input-output Resistance unbalance					11			
Insulation resistance	4,10	4,13	4,9	4,7		4,7		
Voltage proof	5,13	5,14	5	5,8		5		
Current carrying capacity								2
Surge test						6		
Gauging Continuity				13				
MECHANICAL								
Vibration, Jack-plug interface and IDC-wire interface			6					
Durability, Jack-plug interface		6,10						
Plug insertion force, Jack-plug interface	6,18							
Plug withdrawal force, Jack-plug interface	7,19							
Plug retention in jack, Jack-plug interface	8,20							
Mechanical Gauging				12				
Panel Housing retention								3
ENVIRONMENTAL								
Thermal shock cycling	9							
Humidity-temperature cycling	15						5	
Stress relaxation, (dry heat)				6			4	
Flowing mixed gas corrosion, jack-plug interface		7						
TRANSMISSION (c)								
Attenuation (Insertion Loss)					4			
NEXT (Near End Cross Talk)					5			
Return Loss					6			
FEXT (Far End Cross Talk)					7			
TCL (Transverse conversion Loss)					8			
TCTL (Transverse conversion Transfer Loss)					9			
Transfer Impedance							9	
Coupling Attenuation							10	
PSANEXT					12			
PSAFEXT					13			

- NOTE** (a) See paragraph 4.1.A.
 (b) Numbers indicate sequence in which tests are performed.
 (c) Transmission parameters: Checked as a Cat. 6A Connecting Hardware configuration and Class EA Permanent Link conf.
- NOTE** (d) All tests sequences are based on "full test schedule" and "Test groups described on IEC 60603-7-5 and IEC 60603-7-51."

Figure 2

Minimum number of samples required per each test group to be terminated with adequate cable.

Test group	Brief comment	AWG 22 / Solid	AWG 23 / Solid	AWG 24 / Solid	AWG 24/ Stranded	Total per row (Σ)
1 AP	Thermal Shock/Humidity	4	X	4	3 (a)	11
2 BP	Gas Corrosion	4	X	4	3 (a)	11
3 CP	Vibration	4	X	4	3 (a)	11
4 DP	Stress relaxation (Gauges)	4	X	4	3 (a)	11
5 EP	Transmission parameters (Connec. Hardw.)	X	2	X	X	2
6 FP	Surge test	4	X	4	3 (a)	11
7 GP	Transfer Impedance/ Coupling Attenuation	4	X	4	3 (a)	11
8	Current carrying capacity test	X	X	3	3(a)	6
Total per column (Σ)		24	2	27	21 (a)	74

Figure 3

- NOTE** (a) Optional cable for this test. It depends on requester input and cable availability.

Refer to below table for cable type and Tyco Electronics PN's to be used. (Other cable type can be used after engineering approval).

Test group	AWG 22 / Solid	AWG 23 / Solid	AWG 24 / Solid	AWG 24/ Stranded
Cable type	S/FTP	S/FTP	SF/UTP	UTP
Cable PN	1499101-1	1499102-1	219484-2	1711026-2

Figure 3.1

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples (Jacks) shall be prepared in accordance with applicable Instruction Sheets (Refer to Tyco Electronics documents, see paragraph 2.1) and shall be selected at random from current production. All test groups related to figure 3. Shielded Patch Cords PN 959385-X or equivalent shall be delivered with the samples to be tested.

B. Test Sequence

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

4.2. Re-qualification Testing

If changes significantly affecting form, fit or functions are made to the product or manufacturing process, product assurance shall coordinate re-qualification 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 in verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test set-up or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before re-submittal.

4.4. Quality Conformance Inspection

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

ANNEX A: Figures related to test procedures.

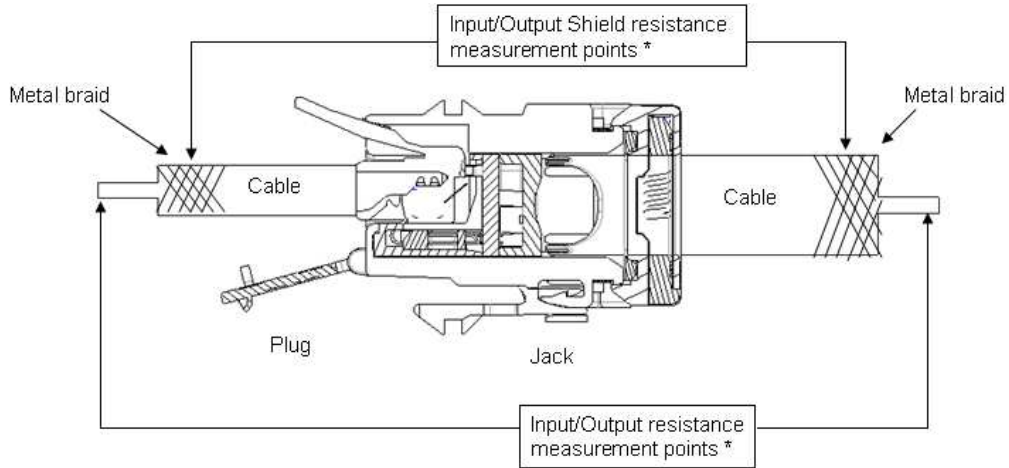


Figure 4

Input/Output and shield resistance measurement points as shown

* Resistance due to wire lengths and cable shielding shall be subtracted from all readings.

NOTE

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. PCB trace length varies with each jack position, therefore, significant variations in termination resistance readings can be expected within each jack assembly.

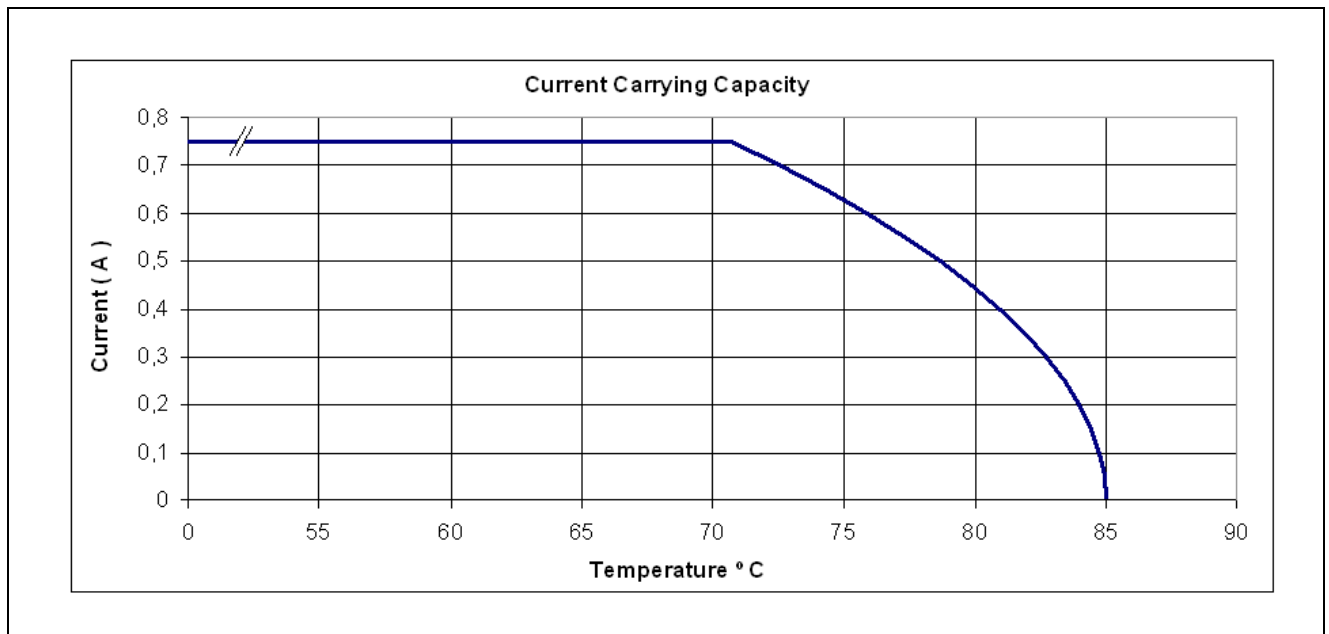


Figure 5

Current-carrying capacity test. Connector de-rating curve.