AMP-TWIST* 6S Series SL Jack

1. SCOPE

1.1 Content

This specification covers performance, tests and quality requirements for AMP NETCONNECT*, **AMP-TWIST* 6S Series SL Jack** for Cat 6 component, Class E systems and Class E_A systems (min. length), used to provide a 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	24-26	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 TE Connectivity Documents.

Document	AMP-TWIST 6S SL Jack	AMP-TWIST 6S BASIC SL Jack
Product Spec.	108-93003	
Instruction sheet	411-93007 & 411-93014	411-93023
Customer drawing	C-1711160 / C-1711342 C-1711295 / C-1711343	C-1711998 C-1711999
Related Part Number	1711160-1 / 1711342-1 1711295-1 / 1711342-1	1711998-1 / 1711999-1
Qualification Test report	501-93016	

Other applicable documents:

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

2.2 Industrial Standards

Standard	Description
A. ISO/IEC 11801. Second Edition 2002 – 09	*Generic Cabling for Customer Premises.*
B. ANSI/TIA/EIA-568-B.2-1. Jun. 2002:	*Commercial Building Telecommunications Cabling Standard. Transmission performance for Category 6 cabling.*
C. DIN IEC 60512	*Basic testing procedures and measuring methods for Electromechanical components for electronic equipment. Test Specifications as indicated in Fig. 1*
D. DIN IEC 60068	*Basic environmental testing procedures. Test Spec. as indicated in Fig.1.*
E. ISO / IEC 60603-7-1 First Edition. 2002-01	*Detail Specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality.*
F. ISO / IEC 60603-7-5 Ed.1.0 (09/2003)	*Detail Specification for 8-way, shielded free and fixed connectors for data transmissions with frequencies up to250 MHz.*
G. IEC 61935-1	*Generic cabling systems-Specification for the testing of balanced communication cabling in accordance with ISO/IEC 11801.*
H. ANSI/TIA/EIA-568-B.2-10 April 2008	*Commercial Building Telecommunications Cabling Standard. Transmission performance for Augmented Category 6 cabling.*

2.3 Other documents. (External doc.)

- *GHMT certificate: Report nº AMPLA0205. Product meets the requirements of Transmission and Transfer Impedance tests.*
- *DELTA certificate: Report number N312095, Danak 19J1478. AMP-TWIST 6S SL jack with PiMF 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 - 26 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 to 70ºC

3.5 Tooling

Connector has to be terminated with tooling PN 1725052-3 (tool kit).

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

Test Description	Requirement	Procedure
Examination of product	Meets requirements of product drawing	Visual, dimensional and functional per applicable quality inspection plan
ELECTRICAL		
Input-output Resistance	ISO/IEC 11801. 2nd Ed. 200 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Measure Jacks mated to a Patch Cord. See figure 6.
Shield resistance	ISO/IEC 11801. 2nd Ed. 100 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Measure Jacks mated to a Patch Cord. See figure 6.
Input-output Resistance unbalance	ISO/IEC 11801. 2nd Ed. 50 mΩ maximum initial and final.	IEC 60512-2-1 Test 2a. Measure Jacks mated to a Patch Cord.
Current carrying capacity	ISO/IEC 11801. 2nd Ed. 0.75 A	IEC 60512-3, Test 5b See Figure 5.
Insulation resistance	ISO/IEC 11801. 2nd Ed. 100 MΩ	IEC 60512-2, Test 3a Method C, 500 V d.c
Voltage proof	ISO/IEC 11801. 2nd Ed. 1 minute hold with no breakdown or flashover. 1 000 Vdc or ac peak. 1 500 Vdc or ac peak.	IEC 60512-2, test 4a Contact / contact. (1000 V peak). Mated connectors. All contacts to Shield. Mated connectors. (1500 V peak)
TRANSMISSION		
	Cat. 6 Connecting Hardware	
NEXT (Near-end Crosstalk) Loss Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-1
PS NEXT (Power sum near end crosstalk) Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-1
Attenuation (= Insertion loss) Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-2

Return loss Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-5
FEXT (Far-end Crosstalk) Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-1
PS FEXT (Power sum far end crosstalk) Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-1
Delay Skew Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat. 6 Limit	IEC 60512-25-4
Transfer Impedance Conn Hdw conf.	ISO/IEC 11801. 2nd Ed. Cat 6 Limit	Mated connectors, terminated with each cable construction intended to be allowed for these connectors. IEC 60603-7-1
	Class E_A Permanent Link (See Note c)	
Return Loss	Class E_A Permanent Link Return Loss requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.11 See Figure 2.1
Insertion Loss	Class E_A Permanent Link Insertion Loss requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.5 See Figure 2.1
NEXT Loss	Class E_A Permanent Link NEXT requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.7 See Figure 2.1
PS NEXT Loss	Class E_A Permanent Link PS NEXT requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	(PS NEXT is computed from NEXT Loss values). See Figure 2.1
ACR-N	Class E_A Permanent Link ACR-N requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.8 See Figure 2.1
PS ACR-N	Class E_A Permanent Link PS ACR-N requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	(PS ACR-N is computed from ACR-N values) See Figure 2.1
FEXT Loss	(There are no requirements for FEXT Loss)	IEC 61935-1, Paragraph 4.9 See Figure 2.1
ACR-F	Class E_A Permanent Link ACR-F requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.10 See Figure 2.1
PS ACR-F	Class E_A Permanent Link PS ACR-F requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	(PS ACR-F is computed from ACR-F values) See Figure 2.1
Propagation delay	Class E_A Permanent Link Prop Delay requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.6 See Figure 2.1
Delay Skew	Class E_A Permanent Link Delay Skew requirements according to Amend. 2 to ISO/IEC 11801 2nd Ed.	IEC 61935-1, Paragraph 4.6 See Figure 2.1

MECHANICAL		
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 terminate jack to frequency range of 10 to 55 Hz with displacement amplitude of 0.35 mm. Sweep cycles per direction shall be 5 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 latch inoperative for 750 cycles at a maximum rate of 500 (automatic) or 300 (manual) cycles per hour.
Plug insertion force, Jack-plug interface	40 Nw maximum, (shielded)	IEC 60512-13-1. 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	40 Nw maximum, (shielded)	IEC 60512-13-1. 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	Plug shall not dislodge from jack, and shall maintain electrical continuity.	IEC 60512-8, test 15f. Apply an axial load of 90 N to the cable which is terminated to the plug, at a rate of 25 mm/min with plug mated in jack and latch engaged. Maintain load for 5 seconds.
Termination tensile strength, vertical, IDC-wire interface	Wire Size (AWG) — Nw Minimum 22 Solid — 6’8 23 Solid — 4’5 24 Solid — 4’5 24 Stranded — 6’8 26 Stranded — 8’5	IEC 60512-8, test 15f. Determine slot tensile strength. Apply an axial load of 90 N to the cable which is terminated, at a rate of 25 mm/min. See figure 7.
Durability repeated, IDC-wire interface	See note	TIA/EIA 568-B-2. Terminate and re-terminate IDC’s on jack 4 times with 22 AWG solid wire and last time with AWG 26 Stranded.
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.
Front/rear housing retention	90 Nw minimum	Measure front/rear housing retention once the jack is assembled (with no cables). See figure 8.

ENVIRONMENTAL		
Thermal shock. Jack-plug interface and IDC-wire interface	See note	IEC 60068-2-14 Subject mated plug and terminated jack to 100 cycles between -40º and 70ºC. Duration exposure shall be 30 minutes
Humidity-temperature cycling. 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 25º and 65ºC at 93% RH with a -10ºC sub-cycle shock.
Humidity, steady state. Jack-plug interface and IDC-wire interface	See note	IEC 60512-11-12 Subject mated plug and terminated jack to 55ºC and 95% RH for 10 days.
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 70º C for 500 hours. (Half samples connected to 0.5 A 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_2S 0,1 ppm (Volume) T= (25 ± 2)ºC HR= (75 ± 3) % Test time: 4 days.

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.*

3.8. Product Qualification and Re-qualification Test Sequence.

	Test Group (a)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Test Sequence (b)												
Examination of product	1,9	1,9	1,11	1,3	1,7	1,5	1,7	1,5	1,3	1,19	1,3	1,3	1,3
ELECTRICAL													
Input-output Resistance	2,8	2,8	2,10		2,6		2,6						
Shield Contact resistance	3,7	3,7	3,9		3,5		3,5						
Input-output Resistance unbalance	4,6												
Current carrying capacity									2				
Insulation resistance			4,8										
Voltage proof								2,4					
MECHANICAL													
Vibration, Jack-plug interface and IDC-wire interface			5										
Durability, Jack-plug interface							4						
Plug insertion force, Jack-plug interface						2							
Plug withdrawal force, Jack-plug interface						3							
Plug retention in jack, Jack-plug interface						4							
Termination tensile strength, vertical, IDC-wire interface				2									
Durability repeated, IDC-wire interface		4											
Panel housing retention												2	
Front/Rear housing retention													2
ENVIRONMENTAL													
Thermal shock, IDC-wire interface		5	6										
Humidity-temperature cycling, IDC- wire interface		6	7										
Humidity, steady state, jack-plug interface								3					
Stress relaxation, (dry heat), IDC-wire interface	5									9			
Flowing mixed gas corrosion, jack-plug interface					4								
TRANSMISSION (Cat. 6 Connecting Hardware config.)													
NEXT (Near End Cross Talk)										2,10			
Power Sum NEXT										3			
Attenuation (Insertion Loss)										4,11			
FEXT (Far End Cross Talk)										5			
Power Sum FEXT										6			
Return Loss										7,12			
Delay Skew										8			
Transfer Impedance											2		

NOTE

(a) See paragraph 4.1.A.

(b) Numbers indicate sequence in which tests are performed.

(c) Transmission parameters: Cat. 6 Connecting Hardware..

Figure 2

TRANSMISSION (Class E_A Permanent Link Configuration) – (See note c)	Test Group 10 (a)	
Examination of product	1	
Wire map and Shield continuity	2	
Return Loss	3	
Insertion Loss	4	
NEXT	5	
PS NEXT Loss	6	
ACR-N	7	
PS ACR-N	8	
FEXT	9	
ACR-F	10	
PS ACR-F	11	
Propagation Delay	12	
Delay Skew	13	

NOTE

(a) See paragraph 4.1.A.

(b) Numbers indicate sequence in which tests are performed.

(c) Transmission parameters: Class E_A *2-Connectors Permanent Link. (Min. Length: 22 meters).*

(d) Recommended AWG 23 Solid cable. It depends on requester input and cable availability.

Figure 2.1

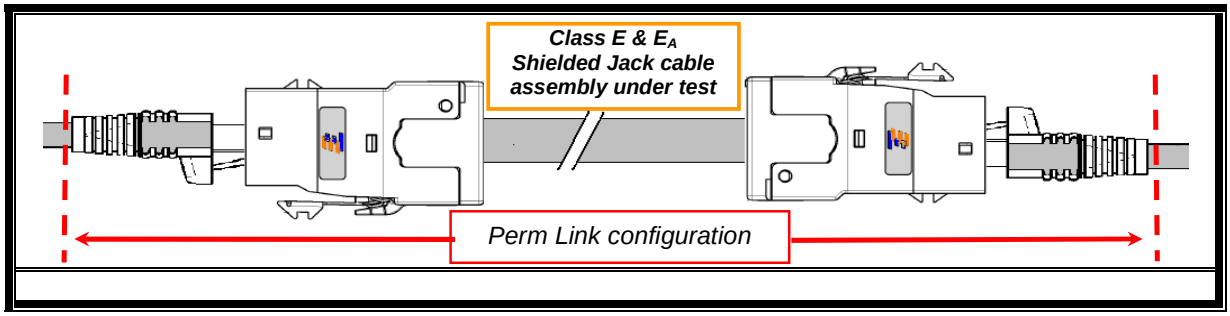

Figure 3
Test set up – Permanent Link configuration

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

Test group	AWG 22 /Solid	AWG 24 /Solid	AWG 24 /Stranded	AWG 26 /Stranded
1	1	3	5	5
2	5	-	-	-
3	3	3	3	3
4	5	-	-	5
5	5	-	-	5
6	5	-	-	-
7	5	-	-	-
8	4	4	4	4
9	-	1	-	3
10	4	4 *(a)*	8 *(a)*	4
11	-	-	-	3
12	-	-	-	-
13	-	-	-	-

Figure 4

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

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 shall each consist of a minimum of 5 samples. Shielded Patch Cords PN 959385-X or equivalent shall be delivered with the samples to be tested. As a reference take in consideration fig. 4.

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.

Figures related to tests:

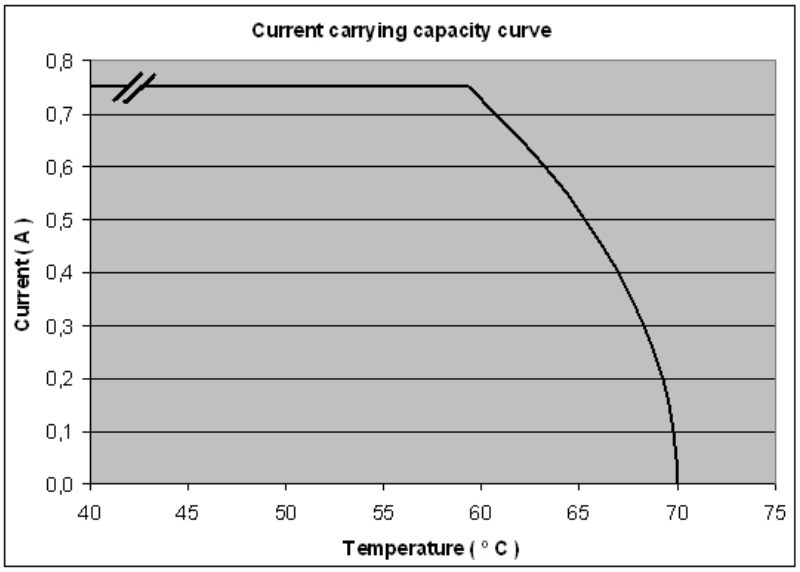

Figure 5
Current-carrying capacity

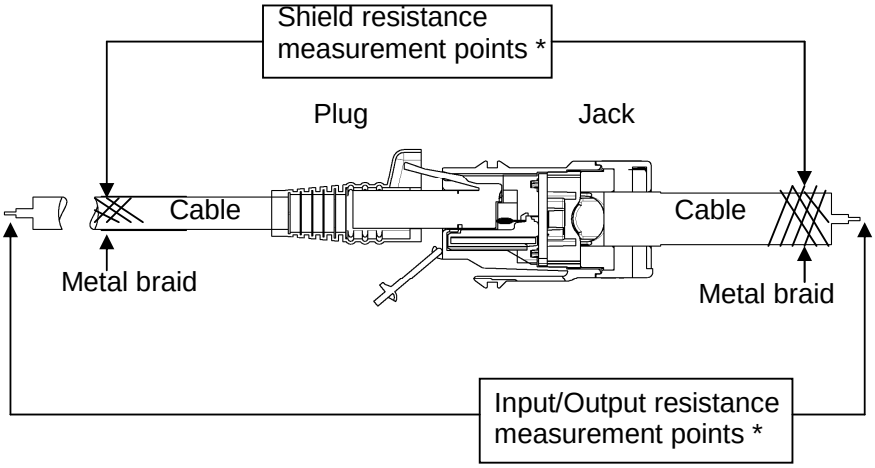

Figure 6
Input/Output and shield resistance measurement points as shown

NOTE

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

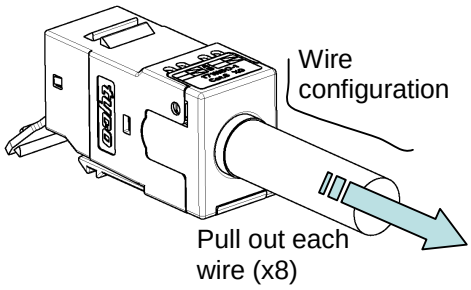

Figure 7
Termination Tensile Strength Vertical Pull

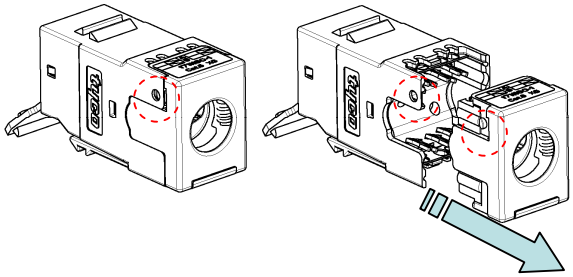

Figure 8
Front/Rear Housing retention