

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 (mm.)	Cable diameter Range (mm.)
22-24-26	24-26	1.60	5.0- 9.0

Table 1: Cable types accommodated by jack connector

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 (TE) Documents.

Document	AMP-TWIST 6S SL Jack	AMP-TWIST 6S BASIC SL Jack
Product Spec.	108-93003	
Instruction sheet	411-93007 411-93014 411-93029	411-93023
Customer drawing	C-1711160 / C-1711342 C-1711295 / C-1711343 C-2153249	C-1711998 C-1711999
Related Part Number	1711160-1 / 1711342-1 1711295-1 / 1711343-1 2153249-1	1711998-1 / 1711999-1
Qualification Test report	501-93016	

Table 2: TE Connectivity documents

Other applicable documents:

- 109-197: AMP Test Specification vs. EIA and IEC Test Methods.
- TEC-138-702: Supplier requirements for Product Environmental Compliance.

2.2 Industrial Standards

Standard	Description
ISO/IEC 11801. Ed. 2.2	<i>Information Technology - Generic Cabling for Customer Premises.</i>
ANSI/TIA-568-C.2	<i>Balanced Twisted-Pair Telecommunications Cabling and Components Standards</i>
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>
IEC 60603-7 Ed. 3.0	<i>Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors.</i>
IEC 60603-7-1 Ed. 2.0	<i>Detail Specification for 8-way, shielded free and fixed connectors.</i>
IEC 60603-7-5. Ed. 2.0	<i>Detail Specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz.</i>
IEC 61935-1 Ed. 3.0	<i>Specification for the testing of balanced and coaxial information technology cabling – Part 1: Installed balanced cabling as specified in ISO/IEC 11801 and related standards</i>
EIA-364	<i>Electrical Connector/Socket test Procedures Including Environmental Classifications.</i>
EN 50289-1-14	<i>Specification for test methods- Part 1-14- Electrical test methods- Coupling attenuation or screening attenuation of connecting hardware.</i>

Table 3: Industrial Standards

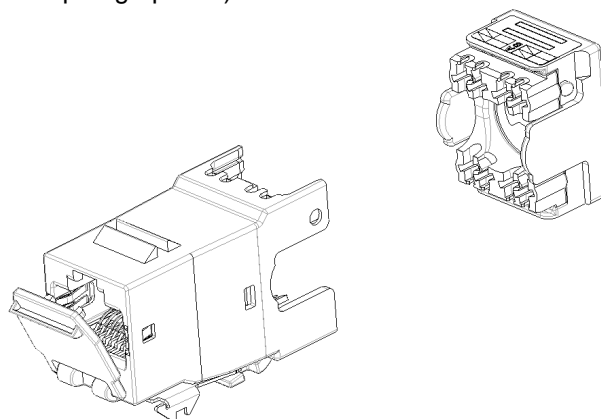
2.3 Other documents. External certificates

- *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. (Refer to **table 2** shown on paragraph 2.1).



Product view: Product Part Number 1711160-1, for reference only.

3.2 Materials

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

3.3 Wire range. (Refer to *table 1*).

A. Conductor range (Ø mm):	0.51 - 0.65
B. Solid conductor range:	22 – 24 - 26 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. Testing Temperature:	-40 to 70°C
D. Operation Temperature:	-10 to 60°C

3.5 Tooling

Connector has to be terminated with SL Series Jack tool PN 1725150-3 (tool kit). (Refer to related Instruction sheet shown on *table 2*- paragraph 2.1).

3.6 Performance requirements and test procedures

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. Refer to *Annex A* for related test procedure figures.

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		
Input to output DC Signal Contact Resistance	ISO/IEC 11801 200 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Mated connectors (refer to figure 4)
Input to output DC Shield Contact Resistance	IEC 60603-7-1 100 mΩ maximum initial and final.	IEC 60512-2, Test 2a. Mated connectors (refer to figure 4)
Contact Resistance between separable fixed and free connectors	IEC 60603-7-1 Signal contacts: 20mΩ max Shield contacts: 20mΩ max ΔR = 20 mΩ	IEC 60512-2, Test 2a. Mated connectors.
Input to output Resistance Unbalance	ISO/IEC 11801 50 mΩ maximum	IEC 60512-2-1 Test 2a. Mated connectors.
Current carrying capacity	IEC 60603-7 1.76 A	IEC 60512-3, Test 5b (see Figure 3)
Insulation resistance	IEC 60603-7 500 MΩ minimum	IEC 60512-3, Test 3a, Method C, 100 V +/- 15 V DC Mated connectors.
Voltage proof	ISO/IEC 11801 1 minute hold with no breakdown or flashover. Contact to contact: 1000 V DC or AC peak. All contacts to Shield: 1500 V DC or AC peak.	IEC 60512-2, test 4a Mated connectors.

Surge test	ITU-T K.20. (2000-02) 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 test	Contact disturbance. All signal contacts and screen/specimens. 10 μ s maximum.	IEC 60603-7-1 (Annex A)

TRANSMISSION PERFORMANCE: Cat 6 Connecting Hardware requirement

NEXT	ISO/IEC 11801 Cat 6 requirement	IEC 60512-27-100 Test 27c
Insertion loss		IEC 60512-27-100 Test 27a
Return loss		IEC 60512-27-100 Test 27b
FEXT		IEC 60512-27-100 Test 27d
TCL		IEC 60512-27-100 Test 27f
TCTL		IEC 60512-27-100 Test 27g
Transfer Impedance	ISO/IEC 11801	IEC 60512-26-100 Test 26e
Coupling Attenuation	Cat 6 _A requirement	EN 50289-1-14

REMARK: A relaxation of 1.5dB along all frequency range is applied to NEXT requirement in 36-45 Low & High cases as it is defined in IEC 60512-27-100 standard

TRANSMISSION PERFORMANCE: Class E_A 2-connector Channel requirement

NEXT	ISO/IEC 11801 Class E _A 2-connector Channel requirement. (Low IL limit line when applicable)	IEC 61935-1
PS NEXT		
Insertion Loss		
Return Loss		
ACR-N		
PS ACR-N		
ACR-F		
PS ACR-F		
Propagation Delay		
Delay Skew		

REMARK: Minimum length applicable for Class E_A 2-conn Channel is 15meter Perm Link + 2meter Patch Cords

MECHANICAL

Vibration, Jack-plug interface and IDC-wire interface	No discontinuities > 10 μ s. Shall remain mated and show no evidence of physical damage. (See note) IEC 60603-7 (§7.3, for locking procedure and sample preparation: Cable length > 20'3 cm.).	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. <ul style="list-style-type: none"> • 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 N 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 N 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 \pm 5 seconds. Rate of load application: 44.5 N/s Maximum.
Mechanical gauging	Passing Go/No Go Test	IEC 60603-7. Annex C.
Panel housing retention	90 N 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 TE Connectivity 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: 1'5 hours.
Humidity-temperature cycling. (Cyclic damp heat). Jack-plug interface and IDC-wire interface		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		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		IEC 60068-2-60 Test Method C. Test Conditions: SO ₂ 0,5 ppm (Volume) H ₂ S 0,1 ppm (Volume) T= (25 \pm 2)°C HR= (75 \pm 3) % Test time: 4 days. Half of samples in mated state. Half of samples in unmated state.

NOTE: Product shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in **Fig. 2** (if applicable).

Figure 1: Performance requirements and test procedures

3.8. Product Qualification and Re-qualification Test Sequence.

All tests sequences are based on full test schedule and test groups described on IEC 60603-7-1. It is recommended to use AWG23 solid cable although it depends on requester input and cable availability.

	Test Group (See §4.1 A)							
	1 AP	2 BP	3 CP	4 DP	5 EP	6FP	7GP	8
	Test Sequence (Numbers indicates sequence in which tests are performed)							
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 (Cat 6 connecting Hardware test)								
Insertion Loss					4			
NEXT					5			
Return Loss					6			
FEXT					7			
TCL					8			
TCTL					9			
Transfer Impedance							9	
Coupling Attenuation							10	

Figure 2: Test Sequence

REMARK An additional test group shall be considering for evaluating Class E_A 2-connectors Channel performance listed in figure 1. Test may be performed with a handheld tester approved by TE Connectivity

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples (Jacks) shall be prepared in accordance with applicable Instruction Sheets (Refer to TE Connectivity 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. Patch cords shall be delivered with the samples to be tested. As a reference, refer to below table. If needed, another equivalent patch cord can be used.

PN	Performance
1644076-X	Cat. 5e
959385-X	Cat. 6
1711815-X	Cat. 6A

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in **Fig. 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 TE Connectivity quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawings and this specification.

5. REVISION SUMMARY

This paragraph is reserved for a revision summary of changes and additions made to this specification.

Rev.	Date	Reason
G	Apr. 22 nd , 2013	Class E _A 2-connector Channel is considered instead of Class E _A 2-connector Permanent Link configuration from transmission performance requirements.
G1	Aug. 5 th , 2013	Added New PN 2153249-[] and IS 411-93029 in table 2-Sheet 1/8). Refer to paragraph 2.1. (Same performance than 1711342-1).
G2	July, 2 nd , 2014	Table 1 and paragraph 3.3: Added AWG 26/Solid cable. Paragraph 4.1 updated with table.

ANNEX A: Figures related to test procedures

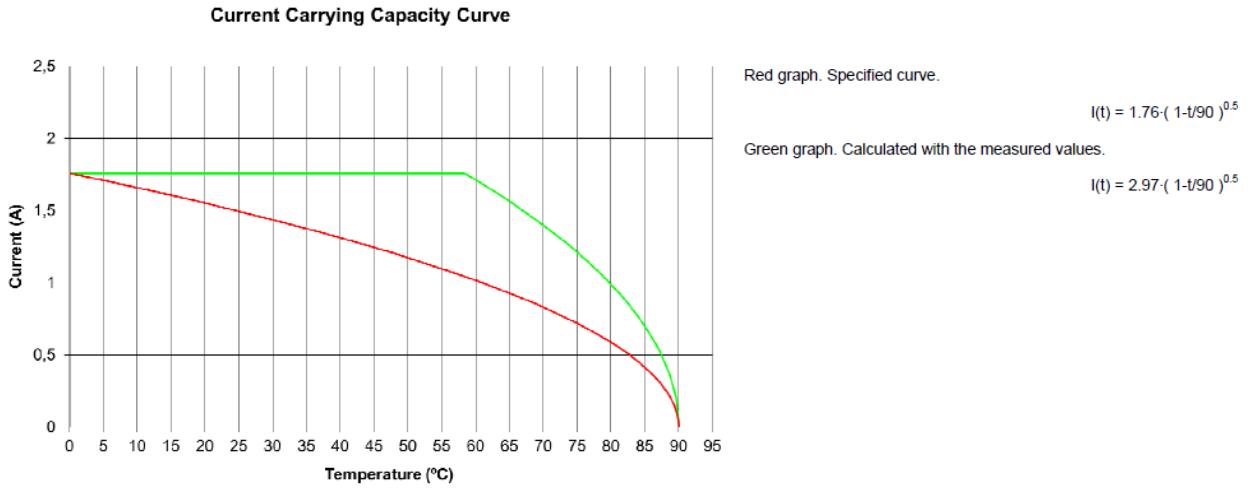


Figure 3: Current-carrying capacity test. Connector de-rating curve.

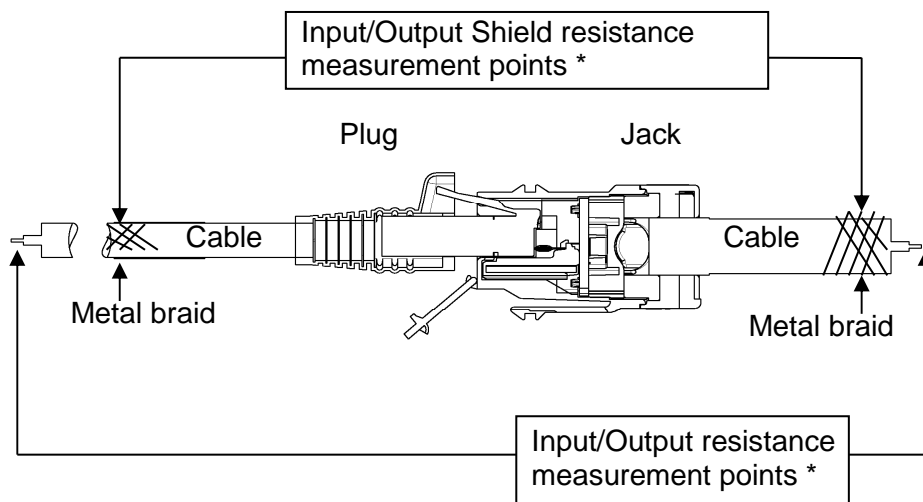


Figure 4: Input/Output and shield resistance measurement points as shown

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.

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