Sealed COPALUM* Transitional Butt Splices, Copper and Aluminum Wire

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for Tyco Electronics uninsulated sealed COPALUM* transitional butt splices intended for termination of stranded copper and aluminum wire used in the aerospace industry.

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. Qualification Test Results

| Successful qualification testing on the subject product line was completed on 27Jul04. The Qualification Test Report number for this testing is 501-431-3. 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 requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. Tyco Electronics Documents

- 108-11011: Product Specification
- 108-11011-1: Product Specification
- 108-11011-2: Product Specification
- 109-197: AMP Test Specifications vs EIA and IEC Test Methods
- 114-2134: Application Specification
- 408-2281: Instruction Sheet
- 501-431-3: Qualification Test Report

2.2. Commercial Standards

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- | SAE-AS7928: Terminals, Lug: Splices, Conductor: Crimp Style, Copper, General Specification
  | For

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

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

3.3. Ratings

- Voltage: 600 volts
- Current: See Figure 3
- Temperature: -55 to 150˚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 per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Millivolt drop.	See Figure 3.	EIA-364-6. Measure millivolt drop of specimens. See Figures 3 and 4.
Temperature rise vs current.	30˚C maximum temperature rise above wire temperature at specified current. See Figure 3.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1˚C. See Figure 3.
Current cycling.	30˚C maximum temperature rise above wire temperature and voltage drop at specified current.	EIA-364-55. Subject specimens to 40 cycles of 60 minutes ON and 30 minutes OFF at test current per Figure 3.
		EIA-364-55. Subject specimens to 10 cycles of 60 minutes ON and 30 minutes OFF at 180˚C wire temperature.

Figure 1 (cont)

Test Description	Requirement	Procedure
	MECHANICAL	
Crimp tensile.	Splice Configuration / Pounds Minimum 4 Al to 8 Cu — 225 6 Al to 6 Cu — 200 4 Al to 4 Cu — 300 1/0 Al to 4 Cu — 550 3/0 Al to 1/0 Cu — 700	EIA-364-8. Determine crimp tensile at maximum rate of 1 inch per minute.
Vibration, sinusoidal.	See Note.	EIA-364-28, Test Condition III. Subject mated specimens to 10-2000 Hz traversed in 20 minutes with .06 inch maximum total excursion or 15 g peak. 4 hours in each of 2 planes. Each specimen shall be mounted by clamping the conductor not more than 1 inch above the vibrating member with a stable clamping device. The other end of the conductor shall be secured to a stable support external to the vibrating table with all slack or tension removed from the wire. See Figure 5.
	ENVIRONMENTAL	
Thermal shock.	See Note.	EIA-364-32. Subject specimens to 5 cycles between -55 and 150°C.
Humidity-temperature cycling.	See Note.	EIA-364-31, Method III. Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A. Subject specimens to 150°C for 120 hours.
Salt spray corrosion.	See Note.	EIA-364-26, Condition A. Subject specimens to 5% salt concentration for 96 hours.

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

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)	
	1	2
	Test Sequence (b)	
Initial examination of product	1	1
Millivolt drop	2,10	2,4
Temperature rise vs current	3,9	
Current cycling		3(c)
Vibration	4	
Crimp tensile	11	
Thermal shock	5	
Humidity-temperature cycling	7	
Temperature life	6	
Salt spray corrosion	8	
Final examination of product	12	5

NOTE

(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Measurements shall be taken every 10 cycles.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall consist of 6 splices prepared per Figure 4. Thermocouples shall be attached to each splice at midway point between ends of splice. Two lead-in conductors shall be prepared by crimping a terminal to each end of a 48 inch length of wire for test group 1 and a 72 inch length of wire for test group 2.

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, 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. When product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan will 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.

Butt Splice Size	"A" Dimension (inches)	Test Current (amperes)	Voltage Drop (millivolts)	
			Maximum Initial	Maximum Final
4 Al to 8 Cu	12	73	8.5 See Note	10.6 See Note
6 Al to 6 Cu	12	83	9.0 See Note	11.0 See Note
4 Al to 4 Cu	24	108	6	8
1/0 Al to 4 Cu	24	135	6	8
3/0 Al to 1/0 Cu	24	245	8.5 See Note	10.5 See Note

NOTE *Maximum voltage drop requirements based on SAE-AS7928 performance requirements.*

Figure 3
Test Current & Millivolt Drop Requirements

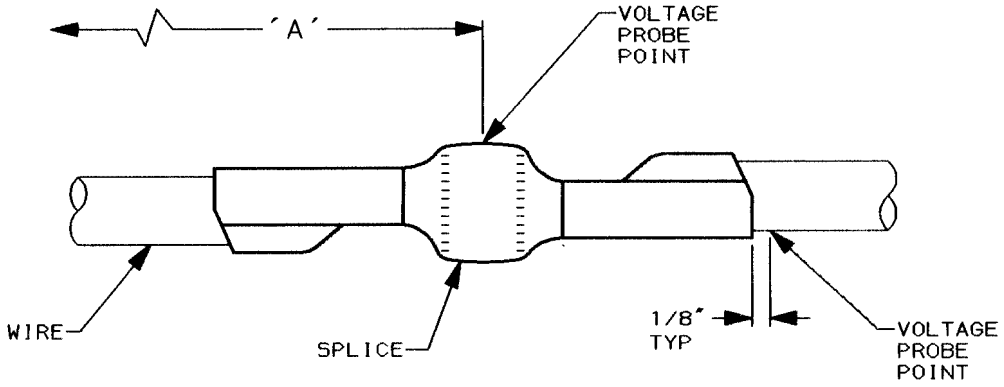

Figure 4
Voltage Probe Points

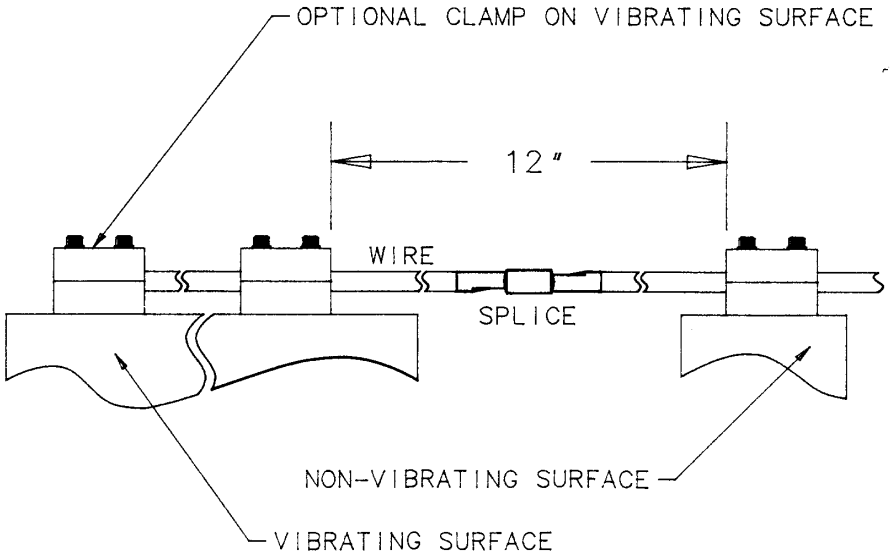

Figure 5
Vibration Mounting Fixtures