High Temperature Sealed COPALUM* Terminals and Slices, BMS13-60 Copper Wire

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for uninsulated high temperature sealed COPALUM* terminals and splices intended for termination of BMS13-60 copper 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.

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

- 109-197: Test Specification (AMP Test Specifications vs EIA and IEC Test Methods)
- 114-2134: Application Specification (COPALUM* Sealed Terminals and Splices)
- 408-2281: Instruction Sheet (Crimping Die Assemblies for COPALUM* Sealed Terminals and Splices)
- 501-134090: Qualification Test Report (High Temperature Sealed COPALUM* Terminals and Splices, BMS13-60 Copper Wire)

2.2. Industry Document

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

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 260°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
Initial examination of product.	Meets requirements of product drawing and Application Specification 114-2134.	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 Figure 4.
Temperature rise vs current.	30°C maximum temperature rise above wire temperature and voltage drop per Figure 3.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C.
Current cycling.	30°C maximum temperature rise above wire temperature and voltage drop per Figure 3.	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.
MECHANICAL		
Crimp tensile.	Wire Size (AWG) / Crimp Tensile kN [lbf] Minimum 4-Cu 2.9 [660] 2-Cu 4.3 [970] 0-Cu 5.6 [1250] 00-Cu 7.3 [1640] 000-Cu 10.1 [2270]	EIA-364-8. Determine crimp tensile at a maximum rate of 25.4 mm [1 in] per minute.

Figure 1 (continued)

Test Description	Requirement	Procedure
Random vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28. For terminal specimens, clamp the terminal tongue no more than 25.4 mm [1 in] above the vibrating surface per Figure 5. Cable support shall be in the center of the specimen and the terminal at the other end shall be mounted on the table in the same manner so that both terminals will be seeing the same vibration. Fixtures used to mount the specimens shall be of non-conductive material such as G-10 so that the terminals are electrically isolated from the vibration table to facilitate discontinuity monitoring. Up to 10 specimens may be mounted to the vibration surface and 4 accelerometers located on the terminal fixtures toward the outside of the specimens. Vibration shall be controlled to obtain the desired level as the average of the 4 accelerometers. The height of the clamp(s) may be adjusted to account for coil set or crimp barrel inclination. A small ring tongue terminal or solder lug can be attached directly under 1 bolt on each terminal to allow for wiring of instrumentation to monitor discontinuities. Subject the specimens to 5 hours in 3 mutually perpendicular axes for a total of 15 hours per Figure 6. Specimens shall be monitored for discontinuities using a current of 100 milliamperes.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32. Subject specimens to 5 cycles between -55 and 260°C with 30 minute dwells at temperature extremes.
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.

Figure 1 (continued)

Test Description	Requirement	Procedure
Temperature life.	See Note.	EIA-364-17, Method A. Subject specimens to 260°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 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 Groups	
	1	2
	Test Sequence (a)	
Initial Examination of Product	1	1
Millivolt Drop	2,10	2,4
Temperature Rise vs Current	3,9	
Current Cycling		3 (b)
Random Vibration	4	
Thermal Shock	5	
Temperature Life	6	
Humidity/Temperature Cycling	7	
Salt Spray Corrosion	8	
Crimp Tensile	11	6
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. Each test group shall consist of a minimum of 10 terminals and 6 splices prepared per Figure 4. Thermocouples shall be attached to each terminal in the transition area between the tongue and the wire barrel and to each splice at the midway point between the ends of the splice. Two lead-in conductors shall be prepared by crimping a terminal to each end of a 1.22 m [48 in] length of wire for test group 1 and a 1.83 m [72 in] 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. If 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 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.

Specimen Size	"A" Dimension (m [in])	Test Current (amperes)	Voltage Drop (millivolts)	
			Maximum Initial	Maximum Final
4-Cu	0.61 [24]	135	2	4
2-Cu	0.61 [24]	181	2	4
1/0-Cu	0.61 [24]	245	2	4
2/0-Cu	0.61 [24]	283	2	4
3/0-Cu	0.61 [24]	328	2	4

Millivolt drop of equivalent length of wire plus value shown in table.
Taken from AS7928 Rev B

Figure 3
Millivolt Drop Requirements

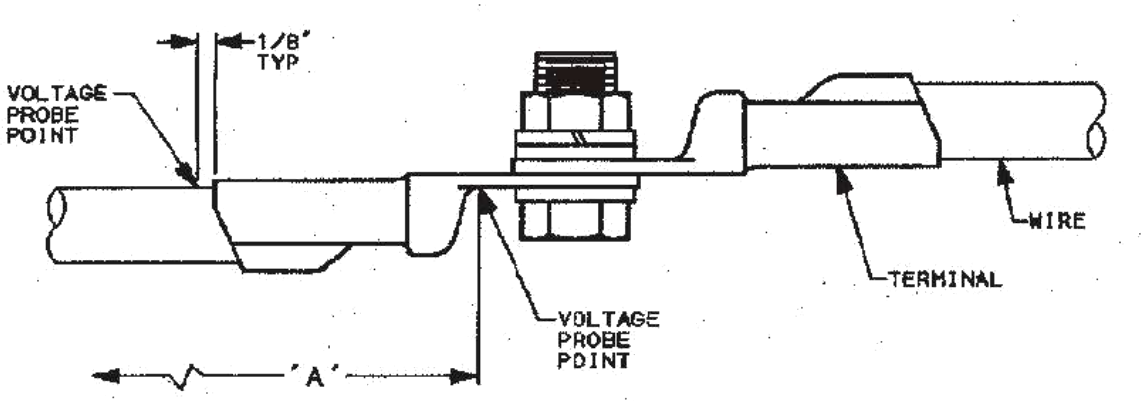


Figure 4
Voltage Probe Points

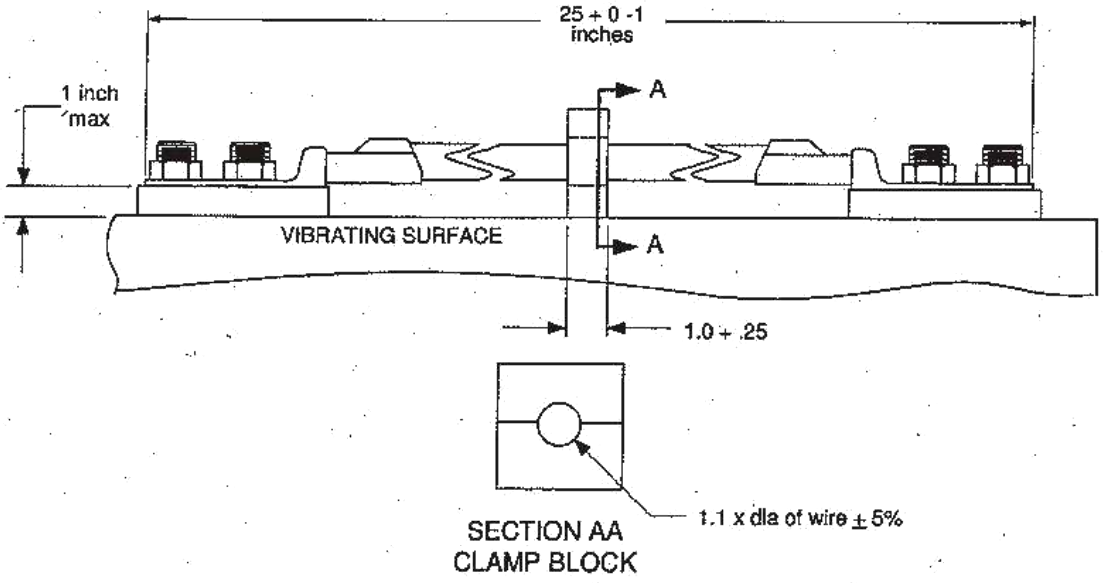
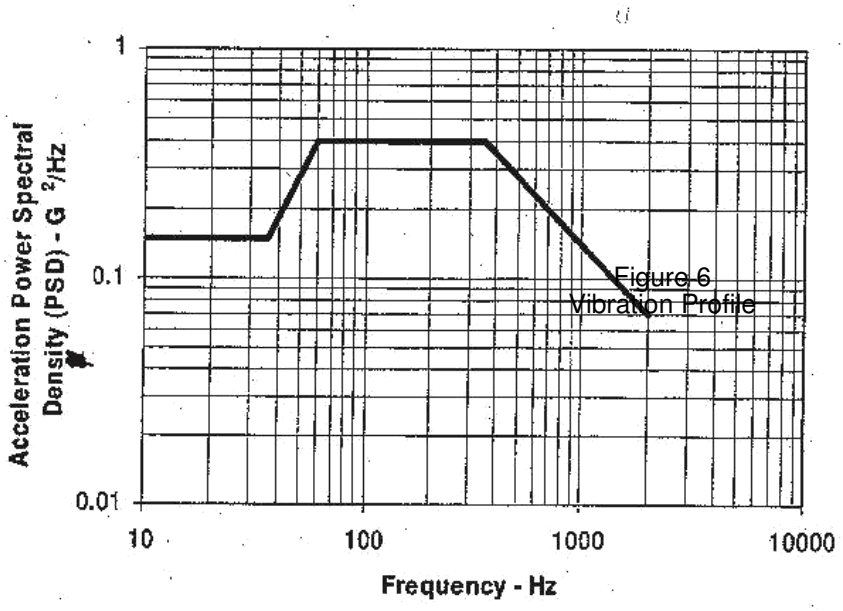


Figure 5
Vibration Clamping



Frequency Hz	PSD G^2/Hz
10	0.15
36	0.15
60	0.4
350	0.4
2000	0.07

Figure 6
Vibration Profile