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**Type III+ Stamped and Formed Contacts**

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**1. SCOPE**

## 1.1. Content

This specification covers the performance, tests and quality requirements for TE Connectivity (TE) crimp Type III+, stamped and formed contacts. These contacts are used in connectors and other electronic components and are primarily intended for use where coupling means is provided separately from individual contact.

## 1.2. Qualification

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

## 1.3. Successful qualification testing on the subject product line was completed on 26Jan88. The Qualification Test Report number for this testing is 501-66. 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. 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 Documents

- 109-1: Test Specification (General Requirements for Test Specifications)
- 109 Series: Test Specifications as indicated in Figure 1
- 114-10004: Application Specification (Type III+ (Size 16) Contacts)
- 501-66: Qualification Test Report (Type III+ Stamped and Formed Contacts)

## 2.2. Military Specification

MIL-W-16878/1 and /4: Wire, Electrical, Insulated, High Temperature

## 2.3. Reference Document

502-1288: Engineering Report (Evaluation Testing of PdNi and Au Plated Type III+ Multimate Contacts)

**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. Material

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

## 3.3. Rating

- Current/Voltage: The continuous current rating for individual contacts cannot be applied directly to the number of contacts as they are dependent on the thermal and physical properties of the material. System design shall assure that continuous current rating does not create internal hot spots that exceed the temperature designated by the connector specification, during steady state or transient conditions.
- Operating temperature:
  - -55 to 150°C for precious metal plated contacts
  - -55 to 90°C for tin plated contacts

## 3.4. Performance and Test Description

Contacts shall be 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 Test Specification 109-1.

## 3.5. Test Requirements and Procedures Summary

Test Description	Requirements	Procedure
Examination of product.	Meet requirements of product drawing and Application Specification 114-10004.	Visual, dimensional and functional per applicable inspection plan.
<b>ELECTRICAL</b>		
Termination resistance, specified current.	See Figure 4.	TE Spec 109-25. Measure potential drop of mated contacts after stabilizing. Calculate resistance. See Figure 3.
Termination resistance, dry circuit.	See Figure 4.	TE Spec 109-6-1. Subject mated contact pair to 50 millivolts open circuit at 100 milliamperes maximum. See Figure 3.
Current cycling.	Termination resistance, specified current.	TE Spec 109-51, Condition B, Test Method 3. Subject mated contacts to 500 cycles at 125% of specified current for 30 minutes ON and 15 minutes OFF.
<b>MECHANICAL</b>		
Contact engaging force.	See Figure 5 for maximum force per contact.	TE Spec 109-35. Measure force to engage using gage 2 as indicated in Figure 6. Engagement depth: .230 ± .010.
Contact separating force.	See Figure 5 for minimum force per contact.	TE Spec 109-35. Size 3 times using gage 2 as indicated in Figure 6, insert gage 1 and measure force to separate. Separation depth: .230 ± .010.

Figure 1 (continued)

Test Description	Requirements	Procedure																				
Crimp tensile.	<table border="1"> <thead> <tr> <th>Wire Size (AWG)</th> <th>Crimp Tensile (lbs minimum)</th> </tr> </thead> <tbody> <tr><td>14</td><td>40</td></tr> <tr><td>16</td><td>40</td></tr> <tr><td>18</td><td>25</td></tr> <tr><td>20</td><td>17</td></tr> <tr><td>22</td><td>10</td></tr> <tr><td>24</td><td>7</td></tr> <tr><td>26</td><td>4</td></tr> <tr><td>28</td><td>2.5</td></tr> <tr><td>30</td><td>1.5</td></tr> </tbody> </table>	Wire Size (AWG)	Crimp Tensile (lbs minimum)	14	40	16	40	18	25	20	17	22	10	24	7	26	4	28	2.5	30	1.5	TE Spec 109-16. Determine crimp tensile at a rate of 1 inch per minute.
Wire Size (AWG)	Crimp Tensile (lbs minimum)																					
14	40																					
16	40																					
18	25																					
20	17																					
22	10																					
24	7																					
26	4																					
28	2.5																					
30	1.5																					
Durability.	Show no evidence of damage; contact engaging and separating force.	TE Spec 109-27, except cycle rate shall not exceed 300 cycles per hour. Contacts shall be installed in a suitable fixture and subjected to 500 cycles for precious metal plated contacts and 50 cycles for tin plated contacts. The applicable counterpart connector inserts may be used for the fixture.																				
<b>ENVIRONMENTAL</b>																						
Thermal shock.	Shall show no evidence of damage; meet termination resistance, dry circuit; termination resistance, specified current; and engaging and separating force.	TE Spec 109-22. Subject mated contacts to 10 cycles between -55 and 90°C for tin plated contacts and -55 and 150°C for precious metal plated contacts.																				
Humidity/temperature cycling.	Termination resistance, dry circuit; engaging and separating force.	TE Spec 109-23, Method III, Condition B. Subject mated connectors to 10 humidity/temperature cycles between 25 and 65°C at 95% RH with cold shock at -10°C less Step 7b..																				
Mixed flowing gas.	Show no evidence of damage; meet termination resistance, dry circuit; and termination resistance, specified current.	TE Spec 109-85-2. Subject mated contacts to environmental class II for 10 days.																				
Temperature life.	Shall show no evidence of damage; meet termination resistance, dry circuit; termination resistance, specified current; and engaging and separating force.	TE Spec 109-43. Subject mated connectors to temperature life for 240 hours at 150°C for precious metal plated contacts and 90°C for tin plated contacts.																				

Figure 1 (end)

## 3.6. Connector Tests and Sequences

Test or Examination	Test Group (a)	
	1	2
	Test Sequence (b)	
Examination of product	1,10	1
Termination resistance, specified current		2,4
Termination resistance, dry circuit	2,7	
Current cycling		3
Contact engaging force	8	
Contact separating force	9	
Crimp tensile		5
Durability	3	
Thermal shock	4	
Humidity/temperature cycling	6(d)	
Mixed flowing gas	6(c)	
Temperature life	5	

**NOTE**

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Precious metal plated samples only.
- (d) Tin plated samples only.

Figure 2

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#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1. Qualification Testing

###### A. Sample Selection

Contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. All test groups shall consist of 10 samples of each part number (pin and socket). One-half of the samples shall be crimped to maximum gauge wire and the other half crimped to minimum gauge wire. All wire lengths shall be a minimum of 12 inches.

- Precious metal plated contacts shall be crimped to wire conforming to MIL-W-16878/4, Type E.
- Tin plated contacts shall be crimped to wire conforming to MIL-W-16878/1, Type B.

###### B. Test Sequence

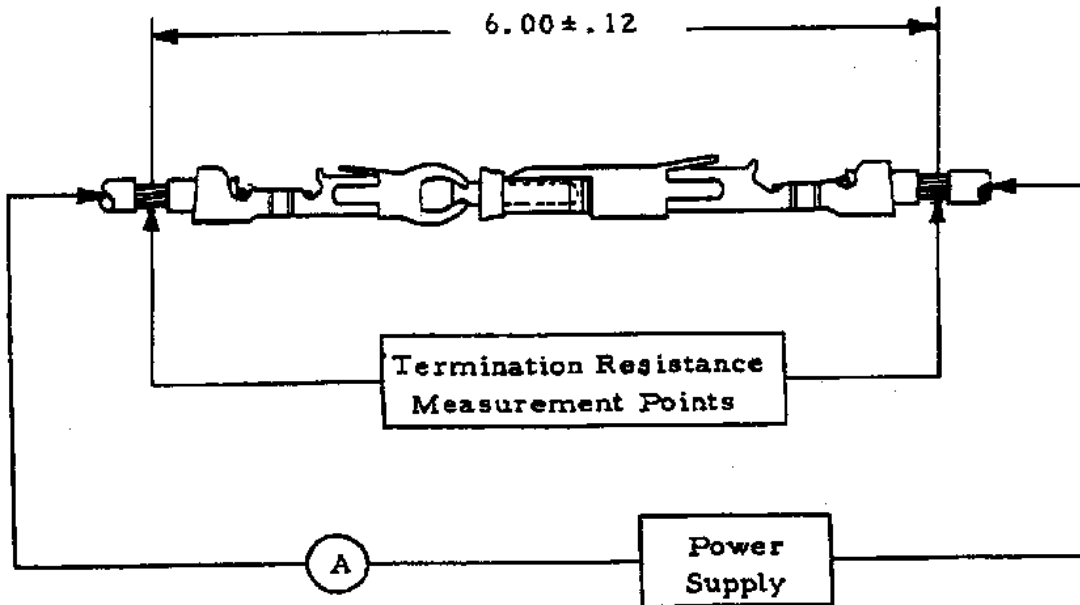
Qualification inspection shall be verified by testing samples as specified in Figure 2.

###### C. Acceptance

- All samples tested in accordance with this specification shall meet the stated tolerance limit.
- Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

##### 4.2. Quality Conformance Inspection

The applicable 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.



**NOTE** Termination resistance equals millivolts divided by test current less resistance of 4.5 inches of wire.

Figure 3  
Termination Resistance Measurement Test Circuit

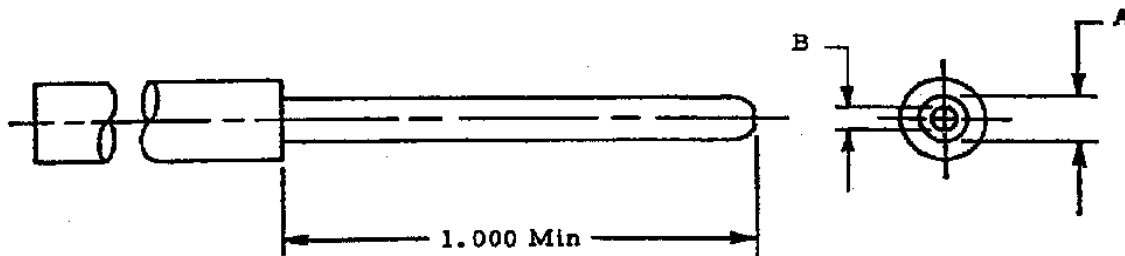
Mating End Size	Wire Size (AWG)	Test Current (amperes)	Resistance (milliohms maximum)
16	14	17	6.00
	16	13	6.50
	18	10	7.50
	20	7.5	9.00
	22	5.0	9.50
	24	3.0	14.5
	26	2.0	19.0
	28	1.5	30.0
	30	1.2	43.0

**NOTE** Single contact free air test currents only, not to be construed as connector rating currents, used only for testing.

Figure 4  
Termination Resistance

Mating End Size	Pin Diameter (inches)	Minimum Separation (ounces)	Maximum Engagement (ounces)
16	.0625	1.5	36.0

Figure 5  
Contact Engagement and Separation Force



Gage Number	Contact Size	A	B Maximum Flat
1	16	.0615 +.0001/-.0000	.015
2	16	.0635 +.0000/-.0001	.015

Figure 6  
Engaging and Separating Gages