

# PRODUCT SPECIFICATION

## 1. SCOPE

### 1.1. Content

This specification covers the performance, tests and quality requirements for the AMP\* crimp type II screw machine contacts size 16 and 20. These contacts are used for the Multimate connectors.

### 1.2. Qualification

When tests are performed on the subject product line, the procedures specified in AMP 109 series specifications 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. 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. AMP Specifications

- A. 109-1: General Requirements for Test Specifications
- B. 109 Series: Test Specifications as indicated in Figure 1.  
(Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364)
- C. 114-10026: Contact, Type II Screw Machine
- D. 501-28: Test Report

## 3. REQUIREMENTS

### 3.1. Design and Construction

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

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FOREIGN PATENTS AND/OR PATENTS PENDING.

J DIST 10		O	Revise per ECN R-1584	PR	2/31 86	DA <i>David R. Reinhardt</i> 2/7/86 CHK <i>W. Andrew Kopecky</i> 2-11-86 APP <i>David Griesemer</i> 2-14-86		<b>AMP</b>   AMP INCORPORATED Harrisburg, Pa. 17105	
						LOC B	NO 108-10039	REV O	
LTR		REVISION RECORD		APP	DATE	SHEET 1 OF 8		TITLE CONTACT, TYPE II, SCREW MACHINE	

### 3.2. Materials

- A. Contact: Copper alloy, gold over nickel plated
- B. Retaining Spring: Stainless steel

### 3.3. Ratings

- A. Current: 13 amperes maximum for size 16 contacts and 7.5 amperes maximum for size 20 contacts, see Para 3.5.(a)
- B. Operating Temperature: -55° to 150°C

### 3.4. Performance and Test Description

Contacts shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1.

### 3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure																											
Examination of Product	Meets requirements of product drawing and AMP Spec 114-10026.	Visual, dimensional and functional per applicable inspection plan.																											
ELECTRICAL																													
Termination Resistance Dry Circuit (Low Level)	<p>Resistance, milliohms maximum</p> <table> <tr> <th>Wire Size, AWG</th><th>16 Initial</th><th>20 Final</th></tr> <tr> <td>14</td><td>2.5</td><td>-</td></tr> <tr> <td>16</td><td>3.0</td><td>3.0</td></tr> <tr> <td>18</td><td>4.5</td><td>4.5</td></tr> <tr> <td>20</td><td>6.0</td><td>6.0</td></tr> <tr> <td>24</td><td>10.0</td><td>10.0</td></tr> <tr> <td>28</td><td>25.0</td><td>25.0</td></tr> <tr> <td>30</td><td>38.0</td><td>38.0</td></tr> <tr> <td>32</td><td>55.0</td><td>55.0</td></tr> </table>	Wire Size, AWG	16 Initial	20 Final	14	2.5	-	16	3.0	3.0	18	4.5	4.5	20	6.0	6.0	24	10.0	10.0	28	25.0	25.0	30	38.0	38.0	32	55.0	55.0	Subject mated contacts to 50 mv open circuit at 100 ma maximum, see Figure 4; AMP Spec 109-6-1.
Wire Size, AWG	16 Initial	20 Final																											
14	2.5	-																											
16	3.0	3.0																											
18	4.5	4.5																											
20	6.0	6.0																											
24	10.0	10.0																											
28	25.0	25.0																											
30	38.0	38.0																											
32	55.0	55.0																											
MECHANICAL																													
Contact Engaging Force	36.0 ounces maximum for size 16 contacts; 22.0 ounces maximum for size 20 contacts.	Measure force to engage using the largest appropriate test pin as indicated in Figure 3; AMP Spec 109-35, engagement depth .170 inch.																											

Figure 1 (cont)

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Test Description	Requirement	Procedure																						
Contact Separating Force	2.0 ounce minimum initial for size 16 contacts, 0.7 ounce minimum initial for size 20 contacts; 1.5 ounce minimum final for size 16 contacts, 0.6 ounce minimum final for size 20 contacts.	Size 1 time using the largest appropriate test pin, as indicated in Figure 3, insert the smallest appropriate test pin and measure force to separate; AMP Spec 109-35, separation depth .170 inch.																						
Crimp Tensile	<table border="1"> <thead> <tr> <th>Wire Size, AWG</th><th>Crimp Tensile, pounds minimum</th></tr> </thead> <tbody> <tr><td>14</td><td>70.0</td></tr> <tr><td>16</td><td>50.0</td></tr> <tr><td>18</td><td>38.0</td></tr> <tr><td>20</td><td>20.0</td></tr> <tr><td>22</td><td>12.0</td></tr> <tr><td>24</td><td>8.0</td></tr> <tr><td>26</td><td>5.0</td></tr> <tr><td>28</td><td>3.0</td></tr> <tr><td>30</td><td>1.5</td></tr> <tr><td>32</td><td>1.0</td></tr> </tbody> </table>	Wire Size, AWG	Crimp Tensile, pounds minimum	14	70.0	16	50.0	18	38.0	20	20.0	22	12.0	24	8.0	26	5.0	28	3.0	30	1.5	32	1.0	Determine crimp tensile at a rate of 1 inch/minute; AMP Spec 109-16.
Wire Size, AWG	Crimp Tensile, pounds minimum																							
14	70.0																							
16	50.0																							
18	38.0																							
20	20.0																							
22	12.0																							
24	8.0																							
26	5.0																							
28	3.0																							
30	1.5																							
32	1.0																							
Durability	Meet termination resistance, dry circuit.	Mate and unmate connectors for 500 cycles at a rate of 300 cycles/hour; AMP Spec 109-27.																						
Contact Pin Strength, Size 20 contacts only	Permanent set shall be no greater than .005 inch.	Contacts shall be mounted in a suitable fixture and a load of .53 pound-inch applied at a maximum rate of 1 inch/minute; AMP Spec 109-139.																						
ENVIRONMENTAL																								
Thermal Shock	No physical damage.	Subject mated connectors to 10 cycles between -55° and 150°C; AMP Spec 109-22.																						
Figure 1 (cont)																								
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Test Description	Requirement	Procedure
Corrosion, Salt Spray	Meet termination resistance, dry circuit. Contacts shall show no corrosion or exposure of basis metal detrimental to their mechanical or electrical performance.	Subject mated connectors to 5% salt concentration for 48 hours; AMP Spec 109-24, cond B.
Mixed Industrial Flowing Gas	Meet termination resistance, dry circuit. Contacts shall show no corrosion or exposure of basis metal detrimental to their mechanical or electrical performance.	Subject mated contacts to environmental class III for 20 days; AMP Spec 109-85-3.
Temperature Life	Termination resistance, dry circuit; engaging and separating force.	Subject mated connectors to temperature life; AMP Spec 109-43, test level II (150°C), test duration D (1000 hours).

- (a) Maximum rated current that can be carried by this product is limited by maximum operating temperature of housings, which is 105°C, and temperature rise of contacts, which is 30°C. Variables which shall be considered for each application are: wire size, connector size, contact material, and ambient temperature.

Figure 1 (end)

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### 3.5. Contact Tests and Sequences

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of Product	1	1	1	1	1
Termination Resistance, Dry Circuit	2,4	4,6	2,5	2,4	
Contact Engaging Force (c)		2,7	6	5	
Contact Separating Force (c)		3,8	7	6	
Crimp Tensile	5				
Durability			4		
Contact Pin Strength (d)					2
Thermal Shock			3		
Corrosion, Salt Spray				3	
Mixed Industrial Flowing Gas	3				
Temperature Life		5			

- (a) See Para 4.1.A.  
 (b) Numbers indicate sequence in which tests are performed.  
 (c) Test a total of 20 sockets per contact size.  
 (d) Perform on contact size 20 only.

Figure 2

## 4. QUALITY ASSURANCE PROVISIONS

### 4.1. Qualification Testing

#### A. Sample Section

Contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. A total of 25 contacts of each style and wire size offered for testing shall be crimped to 12 inch minimum lengths of wire. The samples shall then be divided into 5 groups with 5 samples of each wire size.

#### B. Test Sequence

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

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### C. Acceptance

- (1) Test results from development on pre-qualification samples will be used to determine upper and lower one-sided statistical tolerance limits for 99% reliability at 95% confidence, as follows. Let  $\bar{X}$  and  $s$  denote the sample average and standard deviation, respectively, of the test data. Let  $k$  denote the normal distribution one-sided tolerance factor for 95% confidence and 99% reliability. The value of  $k$  varies with sample size. Values of  $k$  are given in various tables, for example, NBS Handbook 91, Factors for One-Sided Tolerance Limits for Normal Distribution. Suitability of the normal distribution for representing the data shall be verified with normal probability plots, goodness of fit tests, etc.

Then the upper one-sided tolerance limit for 99% reliability at 95% confidence is given by  $\bar{X} + ks$ . The interpretation of this tolerance limit is as follows: based on the test data, and assuming a normal distribution for the test data, we can be 95% confident that 99% of the population of values represented by the sample data will not exceed  $\bar{X} + ks$ . For any test parameter for which there is specified an upper requirement which is not to be exceeded, satisfactory performance of the product is achieved when the value of  $\bar{X} + ks$  does not exceed the requirement value.

The lower one-sided tolerance limit for 95% confidence and 99% reliability is given by  $\bar{X} - ks$ . This has a similar interpretation and corresponding application to lower requirement values.

- (2) 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 AMP 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.

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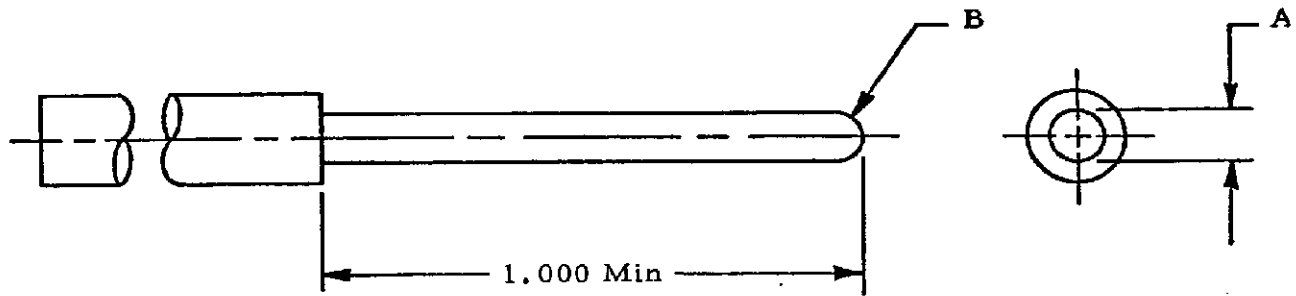
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Contact Size	Gage Number	A	B Maximum Flat
20	1	.039 $\begin{smallmatrix} +.0005 \\ -.0000 \end{smallmatrix}$	.007
20	2	.0410 $\begin{smallmatrix} +.0005 \\ -.0000 \end{smallmatrix}$	
16	3	.0615 $\begin{smallmatrix} +.0000 \\ -.0010 \end{smallmatrix}$	.015
16	4	.0635 $\pm .0000$	

Figure 3

Insertion and Extraction Gage

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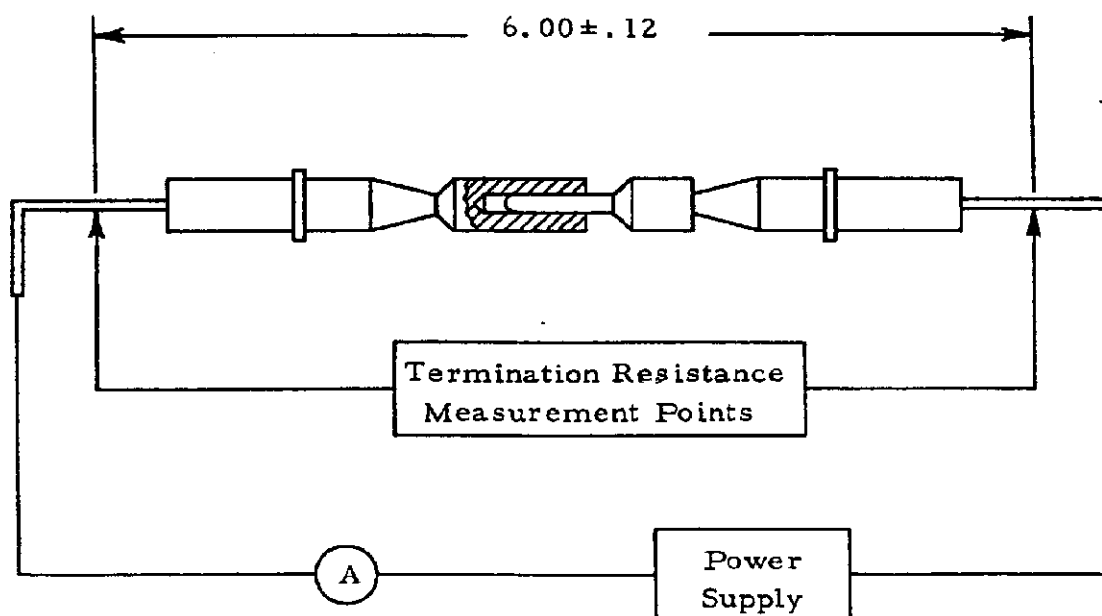
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Note: Termination resistance equals millivolts divided by test current less resistance of 6 inches wire.

Figure 4

Termination Resistance Measurement Test Circuit

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