
MATE-N-LOK* Commercial Connector

1. SCOPE**1.1. Content**

This specification covers the performance requirements for the commercial MATE-N-LOK* connectors. These connectors provide a highly reliable and economic means of grouping multiple-lead connections in today's home entertainment centers, appliances, vending machines, computers, and other sophisticated commercial equipment.

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**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. 114-1012: Contact, Pin and Socket; MATE-N-LOK, Commercial, Application of

2.2. Commercial Standard

- UL 498: Attachment Plugs and Receptacles

3. REQUIREMENTS**3.1. Design and Construction**

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

3.2. Materials

- A. Pins: Brass and phosphor bronze, pre-tin
- B. Sockets, closed seam: Brass and phosphor bronze, pre-tin
- C. Housings: Nylon 6/6, 94V-2

3.3. Ratings

- A. Current/Voltage: 250 vac at 15 amperes maximum
- B. Temperature: -55° to 105°C

3.4. Performance and Test Description

Connector assemblies 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 requirement of product drawing and AMP Spec 114-1012.	Visual, dimensional and functional per applicable inspection plan.																														
ELECTRICAL																																
Termination Resistance, Specified Current	<table border="1"> <thead> <tr> <th>Wire Size, AWG</th> <th>Test Current, amperes</th> <th>Resistance, milliohms maximum initial</th> </tr> </thead> <tbody> <tr><td>30</td><td>0.50</td><td>4.00</td></tr> <tr><td>28</td><td>0.75</td><td>3.50</td></tr> <tr><td>26</td><td>1.00</td><td>3.50</td></tr> <tr><td>24</td><td>1.5</td><td>3.50</td></tr> <tr><td>22</td><td>3.0</td><td>3.50</td></tr> <tr><td>20</td><td>4.5</td><td>3.00</td></tr> <tr><td>18</td><td>6.0</td><td>3.00</td></tr> <tr><td>16</td><td>8.0</td><td>2.75</td></tr> <tr><td>14</td><td>10.0</td><td>2.75</td></tr> </tbody> </table>	Wire Size, AWG	Test Current, amperes	Resistance, milliohms maximum initial	30	0.50	4.00	28	0.75	3.50	26	1.00	3.50	24	1.5	3.50	22	3.0	3.50	20	4.5	3.00	18	6.0	3.00	16	8.0	2.75	14	10.0	2.75	Measure potential drop of mated contacts assembled in housing, see Figure 5; AMP Spec 109-25, calculate resistance.
Wire Size, AWG	Test Current, amperes	Resistance, milliohms maximum initial																														
30	0.50	4.00																														
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16	8.0	2.75																														
14	10.0	2.75																														

Figure 1 (cont)

Test Description	Requirement	Procedure
Termination Resistance, Dry Circuit	4.0 milliohms maximum initial.	Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum, see Figure 5; AMP Spec 109-6-1.
Dielectric Withstanding Voltage	1500 vrms dielectric withstanding voltage.	Test between adjacent pins and sockets of mated connector assemblies; AMP Spec 109-29-1.
Insulation Resistance	500 megohms minimum.	Test between adjacent pins and sockets of mated connector assemblies; AMP Spec 109-28-4.
Temperature Rise vs Current (a)	T-Rise, 30°C maximum at rated current, see Figure 2 and 3; termination resistance, specified current.	T-rise at rated currents specified in Figure 2; AMP Spec 109-45-1.
MECHANICAL		
Vibration (b)	No discontinuities greater than 10 microseconds; termination resistance, dry circuit, 4.25 milliohms maximum.	Subject mated connectors to 10-55-10 Hz traversed in 1 minute at .06 inches total excursion; 2 hours, in each of 3 mutually perpendicular planes; AMP Spec 109-21-1.
Physical Shock (b)	No discontinuities greater than 10 microseconds; termination resistance, dry circuit, 4.50 milliohms maximum.	Subject mated connectors to 50 G's sawtooth in 11 milliseconds; 3 shocks in each direction applied along 3 mutually perpendicular directions total 18 shocks; AMP Spec 109-26-7.

Figure 1 (cont)

Test Description	Requirement	Procedure																				
Mating Force	4.0 pounds maximum per contact.	Measure force necessary to mate connector assembly with locking latches disengaged. Mount connector in fixtures and perform test at .5 inches per minute. Align connector halves where mechanical mating begins and mate additional .100 inch measuring force; AMP Spec 109-42, cond A, calculate force per contact.																				
Unmating Force	0.7 pound minimum per contact.	Measure force necessary to unmate connector assembly with locking latches disengaged. Mount connector in fixtures and perform test at .5 inches per minute; AMP Spec 109-42, cond A, calculate force per contact.																				
Contact Retention	Contact shall not dislodge from housing.	Apply axial load of 15 pounds to crimped contacts gripping wire; AMP Spec 109-30.																				
Crimp Tensile	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Wire Size, AWG</th> <th style="text-align: center;">Crimp Tensile, pounds minimum</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">30</td><td style="text-align: center;">2</td></tr> <tr><td style="text-align: center;">28</td><td style="text-align: center;">3</td></tr> <tr><td style="text-align: center;">26</td><td style="text-align: center;">7</td></tr> <tr><td style="text-align: center;">24</td><td style="text-align: center;">10</td></tr> <tr><td style="text-align: center;">22</td><td style="text-align: center;">15</td></tr> <tr><td style="text-align: center;">20</td><td style="text-align: center;">20</td></tr> <tr><td style="text-align: center;">18</td><td style="text-align: center;">30</td></tr> <tr><td style="text-align: center;">16</td><td style="text-align: center;">30</td></tr> <tr><td style="text-align: center;">14</td><td style="text-align: center;">35</td></tr> </tbody> </table>	Wire Size, AWG	Crimp Tensile, pounds minimum	30	2	28	3	26	7	24	10	22	15	20	20	18	30	16	30	14	35	Determine crimp tensile at a rate of 1 inch/minute; AMP Spec 109-16.
Wire Size, AWG	Crimp Tensile, pounds minimum																					
30	2																					
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16	30																					
14	35																					

Figure 1 (cont)

Test Description	Requirement	Procedure
Durability	Unmating force; 4.5 milliohms maximum termination resistance, dry circuit.	Mate and unmate connector assemblies for 50 cycles; mount appropriate connector half in panel and manually mate; AMP Spec 109-27.
Housing Panel Retention	40 pounds minimum for 3 and 4 circuit, 65 pounds minimum for 6, 9, 12 and 15 circuit.	Measure panel retention force of housing using nominal panel cutout specified in AMP customer drawing; AMP Spec 109-49.
Housing Lock Strength	25 pounds minimum.	Determine strength of housing lock mechanism; AMP Spec 109-50.
ENVIRONMENTAL		
Thermal Shock	Dielectric withstanding voltage; 5.00 milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 25 cycles between -55° and 85°C; AMP Spec 109-22.
Humidity-Temperature Cycling	Insulation resistance; 6.00 milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 10 cycles of humidity-temperature cycling between 25° and 65°C at 95% RH; AMP Spec 109-23, method III, cond B, with low frequency vibration and cold shock at -10°C as specified.
Corrosion, Salt Spray	Termination resistance, dry circuit, 5.50 milliohms maximum.	Subject mated connectors to 5% salt concentration for 48 hours; AMP Spec 109-24, cond B.

- (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.
- (b) Connector assemblies shall remain mated and shall show no evidence of cracking or chipping.

Figure 1 (end)

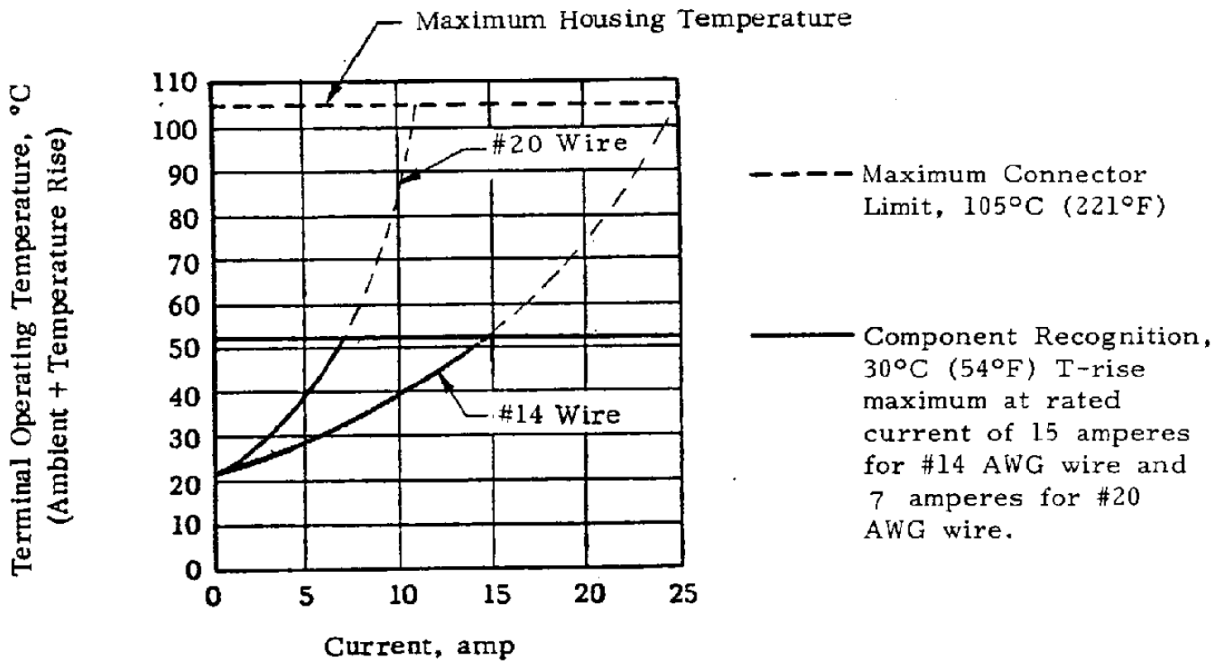


Figure 2

Terminal Temperature vs Current/Circuit, Phosphor Bronze Contacts
4 circuit free Hanging Housing

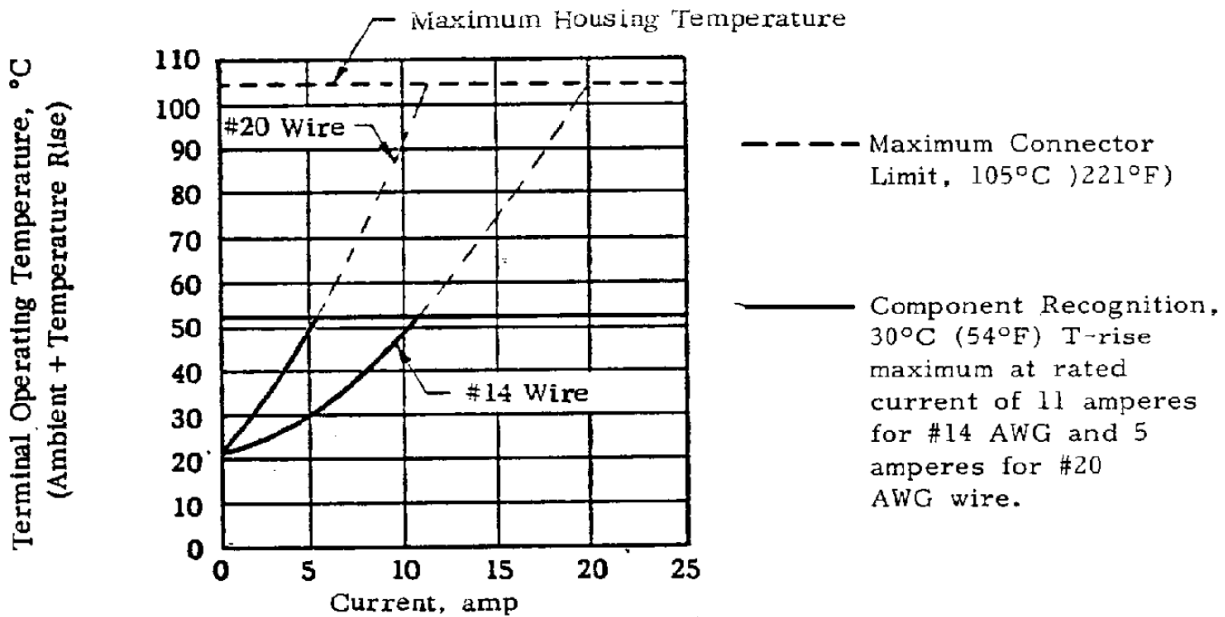


Figure 3

Terminal Temperature vs Current/Circuit, Phosphor Bronze Contacts,
12 Circuit Free Hanging Housing

3.6. Connector Tests and Sequences

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Examination of Product	1							
Termination Resistance, Specified Current			2					
Termination Resistance, Dry Circuit		4,6,9,11		1,3,5,7				
Dielectric Withstanding Voltage		2,13						
Insulation Resistance		3,12						
Temperature Rise vs Current			1					
Vibration				2				
Physical Shock				4				
Mating Force		1						
Unmating Force		7						
Contact Retention						1		
Crimp Tensile					1			
Durability		5						
Housing Panel Retention							1	
Housing Lock Strength								1
Thermal Shock		8						
Humidity-Temperature Cycling		10						
Corrosion, Salt Spray				6				

(a) See Para 4.1.A.

(b) Numbers indicate sequence in which tests are performed.

Figure 4

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets. All groups shall be selected at random from current production. They shall be taken from lots which meet the requirements of group 1. Test groups 2 through 4 shall consist of 4 connector assemblies per group. The housings and wire sizes shall be chosen randomly to cover the range of the product line. Group 5 samples shall consist of 15 pin and socket contacts per wire size. Group 6 samples shall consist of 15 pin and socket contacts crimped on #14 wire and tested with appropriate random housings. Group 7 and 8 samples shall consist of 15 random housings for each group. All contacts shall be crimped to appropriate PN 103501 and 103502 tin plated test conductors in accordance with AMP Specification 114-1012.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 4.

C. Acceptance

(1) Confidence

When testing samples of the product using the procedures specified in Figure 1, at least 99 percent are expected to meet the specification requirements with a confidence of 95 percent.

(2) Failure

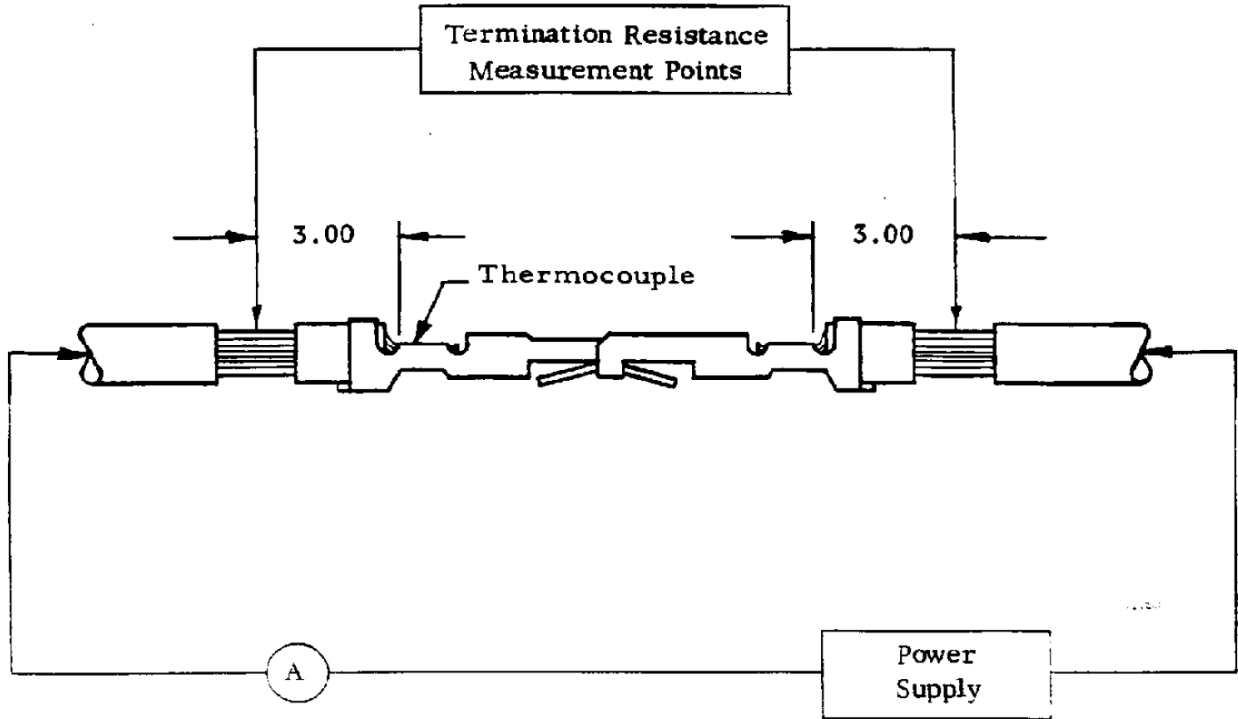
Requirements put on test samples, as indicated in requirement portion of Figure 1, exist as either the upper or lower tolerance limit. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

4.2. Quality Conformance Inspection

The applicable 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.

4.3. Certification

This product has been Recognized under the Component Recognition Program of Underwriters Laboratories Inc., Electrical File Number E-28476 and Certified by Canadian Standards Association, File Number LR-16455.



- Notes:
1. A 1 foot minimum length of continuous lead for heat dissipation.
 2. Termination resistance equals millivolts divided by test current less resistance of 6 inches of wire.

Figure 5

Temperature and Termination Resistance Measurement Points