.140 Diameter MATE-N-LOK* Pin and Socket Connector

1. SCOPE

1.1. Content

This specification covers the performance requirements for the .140 diameter MATE-N-LOK* pin and socket connectors. These connectors are especially designed for use in refrigerators, freezers, air conditioning units, ranges and lighting where large insulation on wires and higher currents are needed.

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. 114-1007: Contact, Pin and Socket, MATE-N-LOK, .140 Diameter, Application of
D. Corporate Bulletin 76: Cross-Reference between AMP Test Specifications and Military or Commercial Documents

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: Brass and phosphor bronze, pre-tin
C. Housings: Nylon 6/6, UL 94V-2

3.3. Ratings

A. Current/Voltage: 250 vac at 17 amperes maximum
B. Operating 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 requirements of product drawing and AMP Spec 114-1007.	Visual, dimensional, and functional per applicable inspection plan.
ELECTRICAL		
Dielectric Withstanding Voltage	3.0 kvac dielectric withstanding voltage, one minute hold.	Test between adjacent pins and sockets of mated connector assemblies; AMP Spec 109-29-1.
Insulation Resistance	1000 megohms minimum initial, 100 megohms minimum final.	Test between adjacent pins and sockets of mated connector assemblies; AMP Spec 109-28.

Figure 1 (cont)

Test Description	Requirement	Procedure
Termination Resistance, Specified Current	Wire Size, AWG / Test Current, amperes / Resistance, milliohms maximum initial 20 — 4.5 — 3.00 18 — 6.0 — 2.50 16 — 8.0 — 2.50 14 — 10.0 — 2.00 12 — 12.0 — 1.50 10 — 14.0 — 1.50	Measure potential drop of mated contacts assembled in housing, see Figure 4; AMP Spec 109-25, calculate resistance.
Temperature Rise vs. Current (a)	Temperature rise, see Figure 2; termination resistance, specified current.	Temperature rise at rated current; AMP Spec 109-45.
Termination Resistance, Dry Circuit	1.40 milliohms maximum initial.	Subject circuits of mated connector assembly to 50 mv open circuit at 100 ma maximum, see Figure 4; AMP Spec 109-6, cond A
MECHANICAL		
Mating Force	4.5 pounds maximum per contact.	Measure force necessary to mate connector assembly with latches a distance of .075 inch from point of initial contact, incorporating free floating fixtures, at a rate of 1 inch/minute; AMP Spec 109-42, cond A, calculate force per contact.
Unmating Force	.8 pound minimum per contact.	Measure force necessary to unmate connector assembly with latches disengaged, at a rate of 1 inch/minute; AMP Spec 109-42, cond A, calculate force per contact.
Contact Retention	30 pounds minimum.	Apply an axial load to crimped contacts gripping wire at a rate of 0.5 inch/minute; AMP Spec 109-30.

Figure 1 (cont)

Test Description	Requirement	Procedure
Crimp Tensile	Wire Size, AWG / Crimp Tensile, pounds minimum: 20 / 20; 18 / 30; 16 / 45; 14 / 50; 12 / 60; 10 / 65	Determine crimp tensile at a rate of 1 inch/minute; AMP Spec 109-16.
Durability	1.50 milliohms maximum termination resistance dry circuit.	Mate and unmate connector assemblies for 25 cycles; mount appropriate connector half in panel and manually mate; AMP Spec 109-27.
ENVIRONMENTAL		
Thermal Shock	Dielectric withstanding voltage; 1.80 milliohms maximum termination resistance, dry circuit; shall remain mated and shall show no evidence of cracking or chipping.	Subject mated connectors to 25 cycles between -55° and 85°C; AMP Spec 109-22.
Humidity-Temperature Cycling	2.30 milliohms maximum termination resistance, dry circuit.	Subject mated connector to humidity-temperature cycling between 25° and 65°C at 95% RH; AMP Spec 109-23, method III, cond B with cold shock at -10°C and low frequency vibration as specified.

(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)

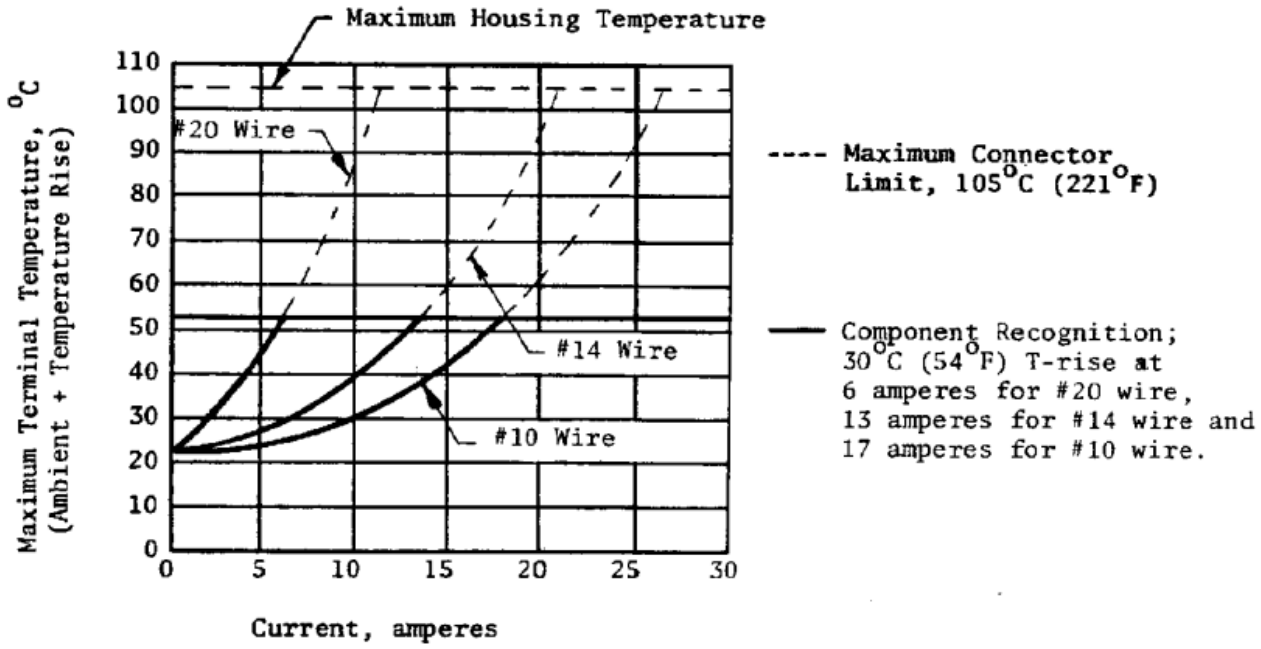


Figure 2
Terminal Temperature vs. Current/Circuit, Phosphor Bronze Contacts, 9 Circuit Free Hanging Housing

3.6. Connector Tests and Sequences

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

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test group 1 shall consist of 1 housing of each size, 5 pins and 5 sockets all representative of the entire lot being testing. Test groups 2 thru 4 shall consist of 3 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 crimped on #12 AWG wire and tested with appropriate random housings. Group 6 shall consist of 15 pin and socket contacts per wire size. All contacts shall be crimped to appropriate PN 103501 and 103502 tin plated test conductors in accordance with AMP Specification 114-1007.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 3.

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 X bar 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 X bar + 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 X bar + 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 X bar + ks does not exceed the requirement value.

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

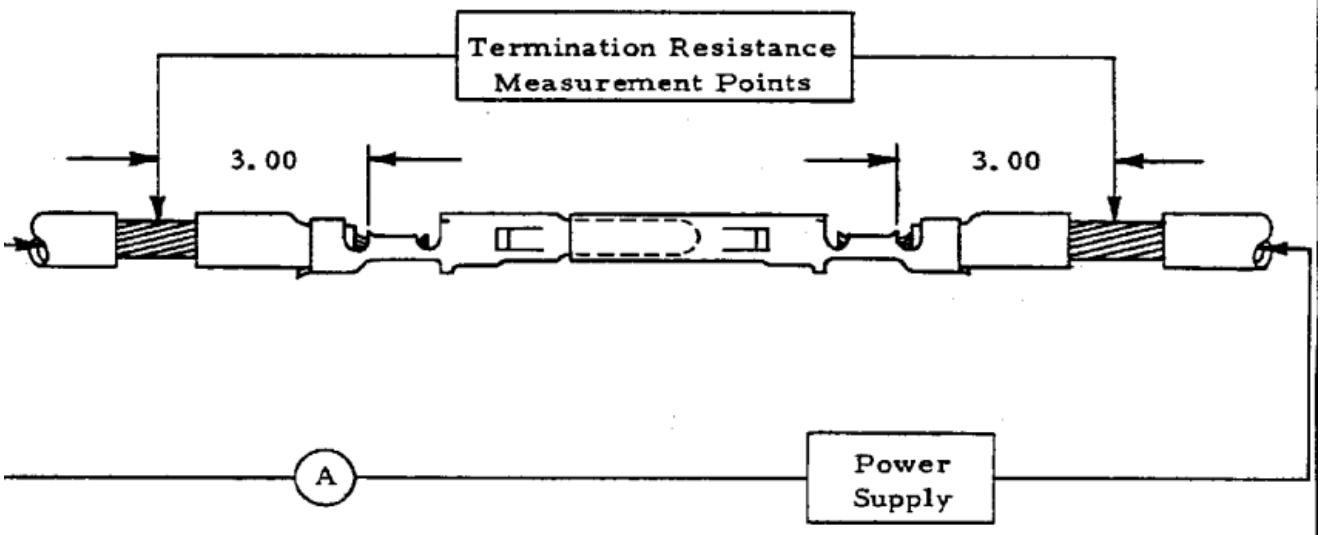
(2) Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

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.

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 Certification 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 4
Termination Resistance Measurement Points