.093 Diameter Commercial Pin and Socket Connector

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for the AMP* Commercial Pin and Socket connectors. These connectors provide a highly reliable and economic means of grouping multiple-lead connectors in todays 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

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. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Military or Commercial Documents
D. 114-49000: Contact Pin and Socket, .093 Diameter, Application of

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

3.3. Ratings

A. Voltage: 250 vac
B. Operating Temperature: -55° to 105°C
C. Current: That current which produces a 30°C (54°F) T-Rise maximum at contact interface and does not exceed 105°C (221°F) on connector housing

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 114-49000.	Visual dimensional and functional per applicable inspection plan.
	ELECTRICAL	
Termination Resistance, Specified Current	Wire Size, AWG / Test Current, ampere / Resistance, milliohms maximum initial 24 / 2.0 / 4.0 22 / 3.0 / 4.0 20 / 4.5 / 4.0 18 / 6.0 / 3.5 16 / 8.0 / 3.5 14 / 10.0 / 3.0	Measure potential drop of mated connector assembled in housing, see Figure 4; AMP Spec 109-25, calculate resistance.
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.

Figure 1 (cont)

Test Description	Requirement	Procedure
Dielectric Withstanding Voltage	1.0 kvac dielectric withstanding voltage, one minute hold.	Test between adjacent contacts of mated connector assembly; AMP Spec 109-29-1.
Insulation Resistance	1000 megohms minimum.	Test between adjacent contacts of mated connector assembly; AMP Spec 109-28-4.
Temperature Rise vs. Current	Temperature rise, see Figure 2; termination resistance, specified current.	T-rise at rated current; AMP Spec 109-45-1.
	MECHANICAL	
Vibration (b)	No discontinuities greater than 10 microseconds.	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.	Subject mated connector to 50 G's sawtooth in 11 milliseconds; 3 shocks in each direction applied along the 3 mutually perpendicular planes total 18 shocks; AMP Spec 109-26-7.
Mating Force	2.5 pounds maximum initial.	Measure force necessary to mate connector assembly with locking latches, a distance of .5 inch from point of initial contact, incorporating free floating fixtures at a rate of .5 inch/ minute; AMP Spec 109-42, cond A, calculate force per contact.

Figure 1 (cont)

Test Description	Requirement	Procedure
Unmating Force	1.5 pounds minimum final.	Measure force necessary to unmate connector assembly with locking latches removed, at a rate of .5 inch/minute; AMP Spec 109-42, cond A, calculate force per contact.
Contact Retention	10 pounds minimum.	Apply axial load to contact at a rate of .5 inch/minute; AMP Spec 109-30, except grip wire.
Crimp Tensile	Wire Size, AWG / Crimp Tensile, pounds minimum 24 / 8 22 / 10 20 / 15 18 / 25 16 / 25 14 / 30	Determine crimp tensile at a rate of 1 inch/minute; AMP Spec 109-16.
Durability	ΔR = 1.5 milliohms maximum termination resistance, dry circuit; unmating force.	Mate and unmate connector assemblies for 50 cycles; AMP Spec 109-27.
Housing Panel Retention	Circuits 2, 4: 55 pounds minimum Circuits 6, 9, 12, 15: 140 pounds minimum	Measure panel retention force using nominal panel cutout dimensions as specified in the AMP Customer Drawing; AMP Spec 109-49.
ENVIRONMENTAL		
Thermal Shock (b)	Dielectric withstanding voltage; ΔR = 2.0 milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 25 cycles between -55° and 105°C; AMP Spec 109-22.

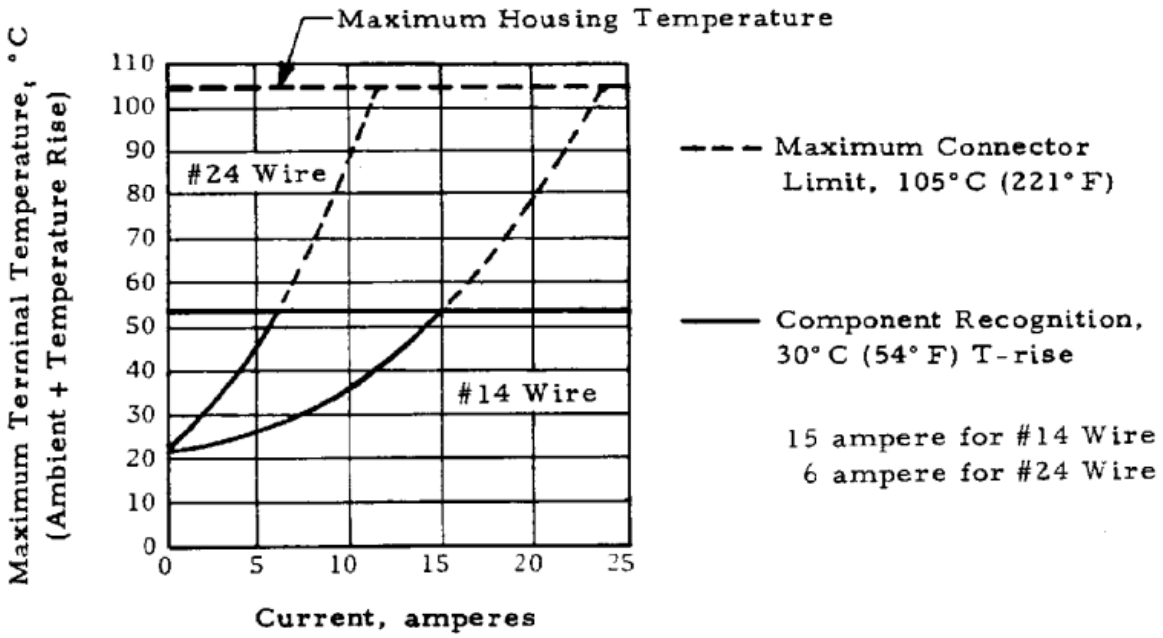
Figure 1 (cont)

Test Description	Requirement	Procedure
Humidity-Temperature	ΔR = 2.0 milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 10 humidity-temperature cycles 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.
Corrosion, Salt Spray	ΔR = 3.0 milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 5% salt concentration for 48 hours; AMP Spec 109-24, cond B.

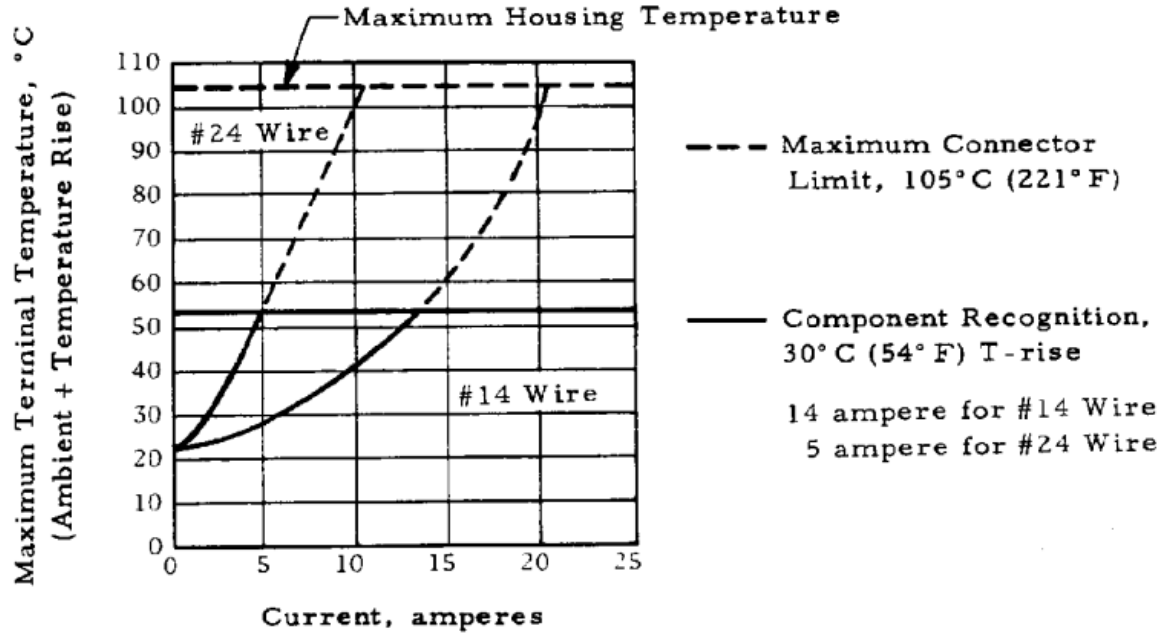
(a) Maximum rated current that can be carried by this product is limited by maximum operating temperature of housings, which is 105°C, and temperature rise of contacts, which is 30°C. Variables which shall be considered for each application are: wire size, connector size, contact material and ambient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

(b) Shall remain mated and show no evidence of damage, cracking or chipping.

Figure 1 (end)



Terminal Temperature vs Current/Circuit Brass Contacts,
4 Circuit Freehanging



Terminal Temperature vs Current/Circuit, Brass Contacts,
15 Circuit Freehanging Housing

Figure 2

3.6. Connector Qualification and Requalification 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, Specified Current				3	
Termination Resistance, Dry Circuit		5,7,10,13	2,4,6,8		
Dielectric Withstanding Voltage		3,11,15			
Insulation Resistance		4,14			
Temperature Rise vs Current				2	
Vibration			3		
Physical Shock			5		
Mating Force		2			
Unmating Force		8			
Contact Retention	2				
Crimp Tensile					2
Durability		6			
Housing Panel Retention				4	
Thermal Shock		9			
Humidity-Temperature Cycling		12			
Corrosion, Salt Spray			7		

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

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Section

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 15 pin and socket contacts crimped on #14 AWG wire and tested with appropriate housings. 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. Test group 5 shall consist of 15 pins and sockets per wire size.

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.

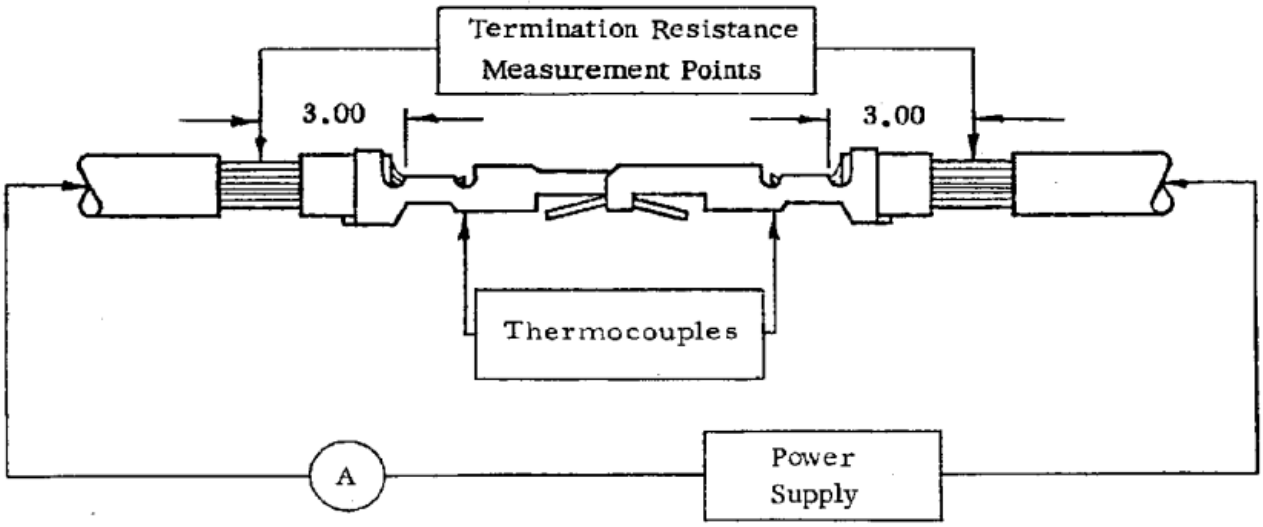
Then the upper one-sided tolerance limit for 99% reliability at 95% confidence is given by X bar + ks. The interpretation of this tolerance limit is as follows: based on the test data, and assuming a normal distribution for the test data, we can be 95% confident that 99% of the population of values represented 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.



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

Resistance and Temperature Measurement Points