
.093 Diameter Commercial Pin and Socket Connector

1. SCOPE

1.1. Content

This specification defines the performance, tests, and quality requirements for TE Commercial Pin and Socket connectors. These connectors provide a highly reliable and economic means of grouping multiple-lead connectors 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 109-series test 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. Specifications

- A. 109-1 General Requirements for Testing
- B. EIA 364- and IEC 60512-series Test Specifications as indicated in Table 1
- C. 109-30 Contact Retention
- D. 109-197 AMP Test Specifications vs. EIA and IEC Test Methods
- E. 114-49000 .093 Diameter Pin and Socket Contacts and Housings

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 or 600 VAC¹
- 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 Table 1.

3.5. Test Requirements and Procedures Summary

Table 1

Test Description	Requirement	Procedure																								
Examination of Product	Meets requirements of product drawing and Application Specification 114-49000.	Visual dimensional and functional per applicable inspection plan.																								
ELECTRICAL																										
Termination Resistance, Specified Current Wire Test	<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;">Test Current, ampere</th> <th style="text-align: center;">Resistance, milliohms maximum</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">24</td> <td style="text-align: center;">2.0</td> <td style="text-align: center;">initial</td> </tr> <tr> <td style="text-align: center;">22</td> <td style="text-align: center;">3.0</td> <td style="text-align: center;">4.0</td> </tr> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">4.5</td> <td style="text-align: center;">4.0</td> </tr> <tr> <td style="text-align: center;">18</td> <td style="text-align: center;">6.0</td> <td style="text-align: center;">4.0</td> </tr> <tr> <td style="text-align: center;">16</td> <td style="text-align: center;">8.0</td> <td style="text-align: center;">3.5</td> </tr> <tr> <td style="text-align: center;">14</td> <td style="text-align: center;">10.0</td> <td style="text-align: center;">3.5</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">3.0</td> </tr> </tbody> </table>	Wire Size, AWG	Test Current, ampere	Resistance, milliohms maximum	24	2.0	initial	22	3.0	4.0	20	4.5	4.0	18	6.0	4.0	16	8.0	3.5	14	10.0	3.5			3.0	Measure potential drop of mated connector assembled in housing, EIA 364-6B and IEC 60512-2-2, and calculate resistance.
Wire Size, AWG	Test Current, ampere	Resistance, milliohms maximum																								
24	2.0	initial																								
22	3.0	4.0																								
20	4.5	4.0																								
18	6.0	4.0																								
16	8.0	3.5																								
14	10.0	3.5																								
		3.0																								
Termination Resistance, Dry Circuit	4.0 milliohms maximum initial.	Subject mated contacts assembled in housing to 50 mV open circuit at 100 mA maximum, EIA 364-23A and IEC 60512-2-1.																								
Dielectric Withstanding Voltage	1.0 KVAC dielectric withstanding voltage, one minute hold	Test between adjacent contacts of mated connector assembly; EIA 364-20B and IEC 60512-4-1.																								
Insulation Resistance	1000 megohms minimum	Test between adjacent contacts of mated connector assembly; EIA 364-21C and IEC 60512-3-1.																								
Temperature Rise vs. Current	Temperature rise, see Figure 1; termination resistance, specified current.	T-rise at rated current; EIA 364 70A and IEC 60512-5-1.																								
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; EIA 364-28D and IEC 60512-6-4.																								
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; EIA 364-27B and IEC 60512-6-3.																								
Mating Force	2.5 pounds maximum initial.	Measure force necessary to mate connector assembly with locking latches, a distance of .50 inch from point of initial contact, incorporating free floating fixtures at a rate of .50 inch/minute; EIA 364-13B and IEC 60512-13-1, calculate force per contact.																								
Unmating Force	1.5 pounds minimum final.	Measure force necessary to unmate connector assembly with locking latches removed, at a rate of .50 inch/minute; EIA 364-13B and IEC 60512-13-1, calculate force per contact.																								

Table 1

Test Description	Requirement	Procedure														
Contact Retention	10 pounds minimum.	Apply axial load to contact at a rate of .50 inch/minute; Test Specification 109-30, except grip wire.														
Crimp Tensile	<table border="0"> <tr> <td>Wire Size, AWG</td> <td>Crimp Tensile, pounds minimum</td> </tr> <tr> <td>24</td> <td>8</td> </tr> <tr> <td>22</td> <td>10</td> </tr> <tr> <td>20</td> <td>15</td> </tr> <tr> <td>18</td> <td>25</td> </tr> <tr> <td>16</td> <td>25</td> </tr> <tr> <td>14</td> <td>30</td> </tr> </table>	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; EIA 364-8B, IEC 60512-16-1 and IEC 60512-16-20.
Wire Size, AWG	Crimp Tensile, pounds minimum															
24	8															
22	10															
20	15															
18	25															
16	25															
14	30															
Durability	$\Delta R = 1.5$ milliohms maximum termination resistance, dry circuit; unmating force.	Mate and unmate connector assemblies for 50 cycles; EIA 364-9C and IEC 60512-9-1.														
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 on the customer drawing.														
ENVIRONMENTAL																
Thermal Shock (b)	Dielectric withstanding voltage; $\Delta R = 2.0$ milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 25 cycles between -55° and 105°C ; EIA 364-32C and IEC 60512-11-4.														
Humidity–Temperature	$\Delta R = 2.0$ milliohms maximum termination resistance, dry circuit.	Subject mated connectors to 10 humidity–temperature cycles between 25° and 65°C at 95% RH; EIA 364-31B, IEC 60512-11-3 and IEC 60512-11-12 method III, with low frequency vibration and cold shock at -10°C .														
Corrosion, Salt Spray	$\Delta R = 3.0$ milliohms maximum termination resistance, dry circuit.	Subject mated to 5% salt concentration for 48 hours; EIA 364-26B.														

- (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.

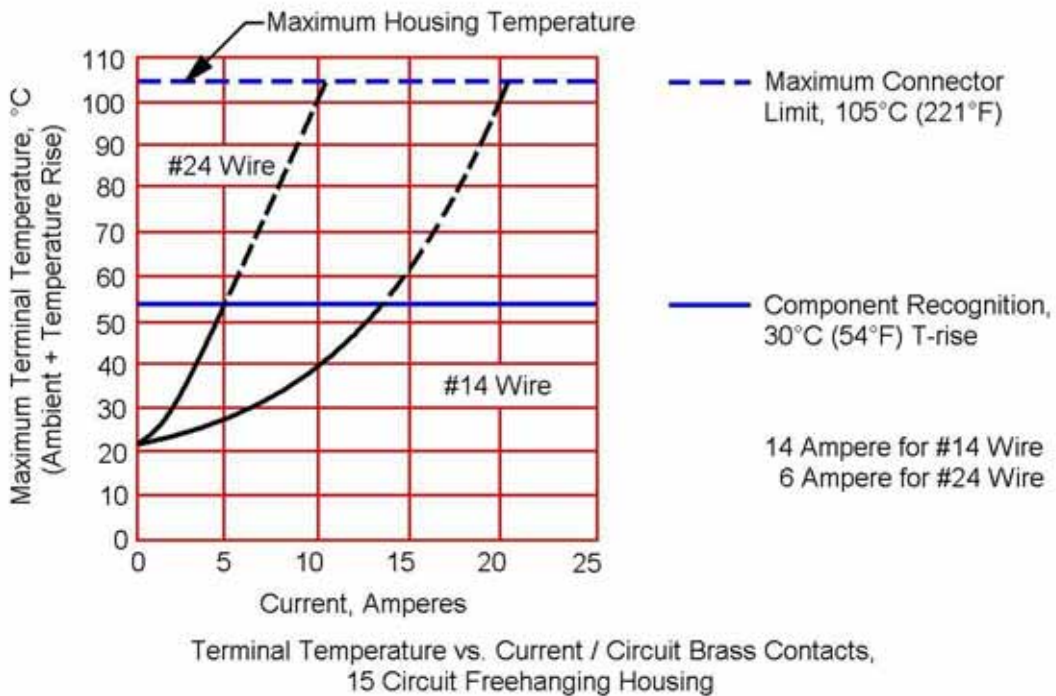
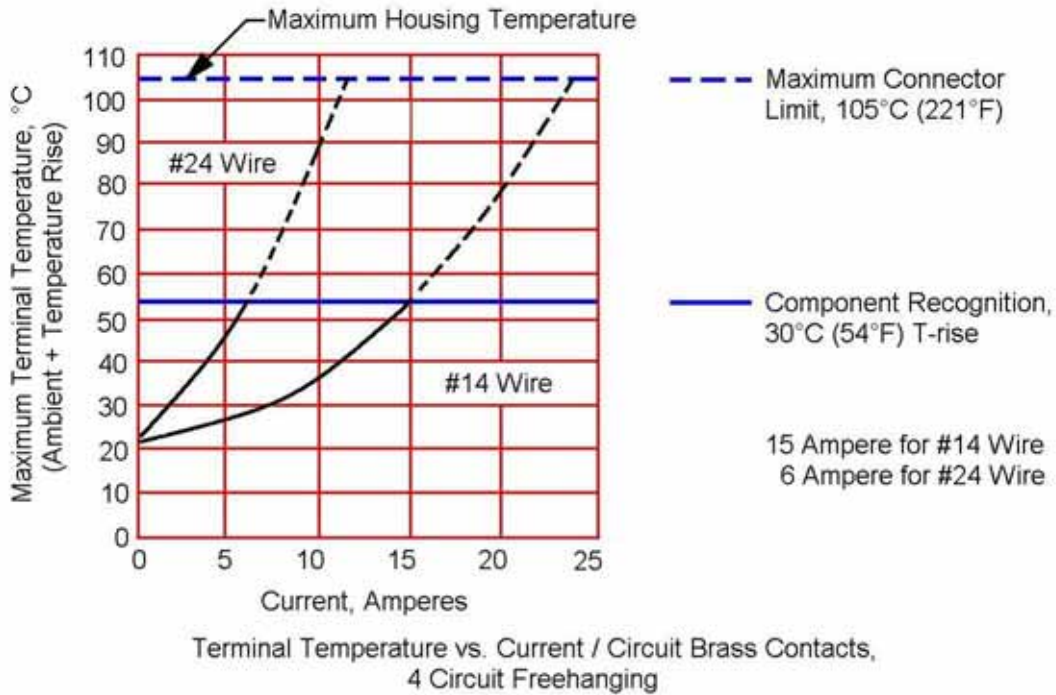


Figure 1

3.6. Connector Qualification and Requalification Tests and Sequences – Table 2

Table 2

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 Paragraph 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 Table 2.

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.

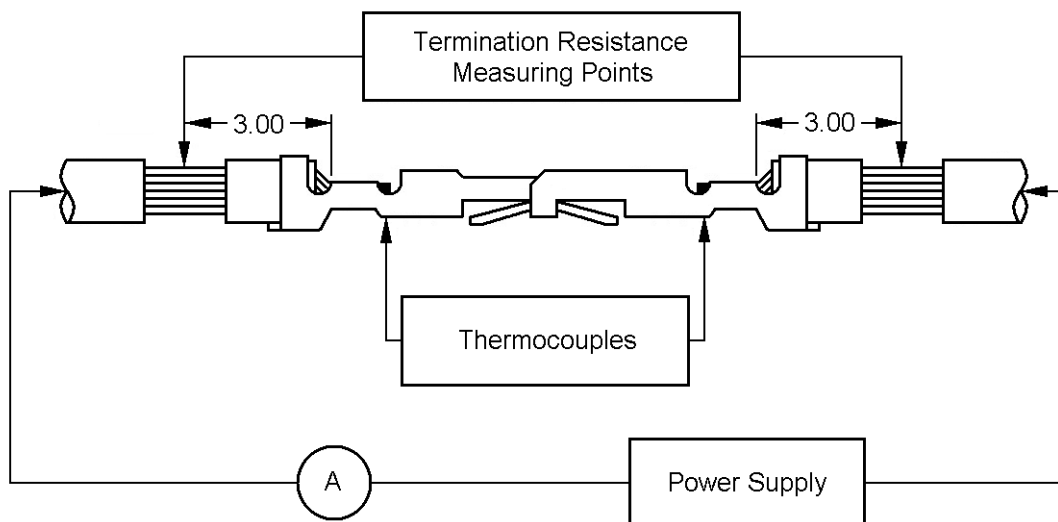
Then the upper one-sided tolerance limit for 99% reliability at 95% confidence is given by **$\bar{X} + ks$** . The interpretation of this tolerance limit is as follows: based on the test data, and assuming a normal distribution for the test data, we can be 95% confident that 99% of the population of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



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.

Resistance and Temperature Measurement Points

Figure 2

¹ Part numbers rated at 600 VAC are:

770065-1, 770066-1, 770068-1, 770069-1, 770266-1, 770269-1, 770276-1, 770329-1, 770330-1,
770336-1, 770337-1, 770338-1, 770339-1, 770360-1, 770361-1, 770364-1, 770365-1, 770372-1,
770373-1, 770424-1, 770425-1, 770450-1, 770451-1, 770452-1, 770453-1, 770771-1, 770783-1,
770784-1, 770785-1, 770810-1