Connector, IDC Commercial MATE-N-LOK*

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the IDC/Commercial MATE-N-LOK* connectors. These connectors provide a means of grouping multiple-lead connections in home entertainment centers, appliances, vending machines, computers, and other commercial equipment.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on Jul97. The test file number for this testing is ACL-1340-039, 040 and 041. This documentation is on file at and available from the Global Automotive Division, Americas North Laboratory.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. 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. TE Connectivity (TE) Documents

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 114-49001: Application Specification
- 501-412: Qualification Test Report

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

- Header: Right angle pin, phosphor bronze, pre-tin
- Housing: Nylon 6/6, UL94V-2
- Pin: Phosphor bronze, pre-tin
- Socket, closed seam: Phosphor bronze, pre-tin

3.3. Ratings

- Voltage: 250 volts AC
- Current: See Figure 4 for applicable current carrying capability. Maximum rated current that can be carried by this product is limited by maximum operating temperature of the housings (105°C) and temperature rise of contacts (30°C). Variables which shall be considered for each application are wire size, connector size, contact material, and ambient temperature.
- Temperature: -55 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per Test Specification 109-1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and Application Specification 114-49001.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance.	3.5 milliohms maximum initial. Maximum/minimum ΔR 10 milliohms.	TE Spec 109-6-6. Subject mated contacts assembled in housing to 20 mv maximum open circuit at 100 ma maximum. See Figure 3.
Insulation resistance.	500 megohms minimum.	TE Spec 109-28-4. Test between adjacent contacts of mated samples.
Dielectric withstanding voltage.	1500 vac at sea level. 1 minute hold with no breakdown or flashover.	TE Spec 109-29-1. Test between adjacent contacts of mated samples.
Temperature rise vs current.	30°C maximum temperature rise at specified current.	TE Spec 109-45-2. Measure temperature rise vs current. See Figure 4.
MECHANICAL		
Vibration, sinusoidal.	No discontinuities of 10 microseconds or longer duration. See Note.	TE Spec 109-21-1. Subject mated samples to 10-55-10 Hz traversed in 1 minute with 0.06 inch maximum excursion. 2 hours in each of 3 mutually perpendicular planes. See Figure 5.

Figure 1 (continued)

Test Description	Requirement	Procedure
Mechanical shock.	No discontinuities of 10 microseconds or longer duration. See Note.	TE Spec 109-26-1, except 30 G's. Subject mated samples to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 5.
Durability.	See Note.	TE Spec 109-27. Mate and unmate samples for 50 cycles at a maximum rate of 600 cycles per hour.
Mating force.	4 pounds maximum per contact.	TE Spec 109-42, Condition A. Measure force necessary to mate samples at a maximum rate of 0.5 inch per minute.
Unmating force.	0.7 pound minimum per contact.	TE Spec 109-42, Condition A. Measure force necessary to unmate samples at a maximum rate of 0.5 inch per minute.
ENVIRONMENTAL		
Thermal shock.	See Note.	TE Spec 109-22. Subject mated samples to 25 cycles between -55 and 85°C.
Humidity-temperature cycling.	See Note.	TE Spec 109-23-3, Condition B. Subject mated samples to 10 cycles between 25 and 65°C at 95% RH.
Temperature life.	See Note.	TE Spec 109-43. Subject mated samples to temperature life at 105°C for 500 hours.

NOTE *Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Examination of product	1,9	1,9	1,8
Termination resistance	3,7	2,7	
Insulation resistance			2,6
Dielectric withstanding voltage			3,7
Temperature rise vs current		3,8	
Vibration	5	6(c)	
Mechanical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity-temperature cycling		4(d)	5
Temperature life		5	

NOTE

(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Discontinuities shall not be measured. Energize at 18°C level for 100% loadings per Test Specification 109-151.
(d) Precondition samples with 5 cycles durability.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Prior to testing, samples shall meet the requirement of the product drawing and Application Specification 114-49001.

Test group 1 shall consist of 8, 4 position wire-to-board right angle connector assemblies and 8, 4 position wire-to-wire connector assemblies. All samples shall be terminated to nominal AWG wire size.

Test group 2 shall consist of 16, 4 position wire-to-board right angle connector assemblies and 16, 4 position wire-to-wire connector assemblies. Eight of the wire-to-board right angle and 8 of the wire-to-wire samples shall be terminated to the minimum AWG wire size and the remaining 8 wire-to-board right angle and 8 wire-to-wire samples shall be terminated to the maximum AWG wire size.

Test group 3 shall consist of 10, 4 position wire-to-board right angle connector assemblies terminated to 16 AWG wire.

B. Test Sequence

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

4.2. Requalification Testing

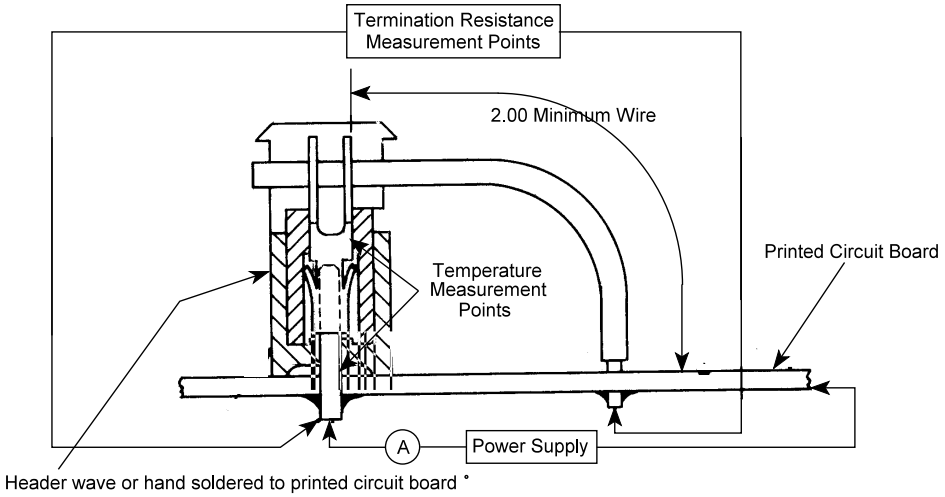
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. 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. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality 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.



NOTE

(a) Termination resistance equals millivolts divided by test current less resistance of wire.
(b) After soldering, board and posts shall be cleaned to remove all flux and contaminates.

Figure 3
Termination Resistance Measurement Points

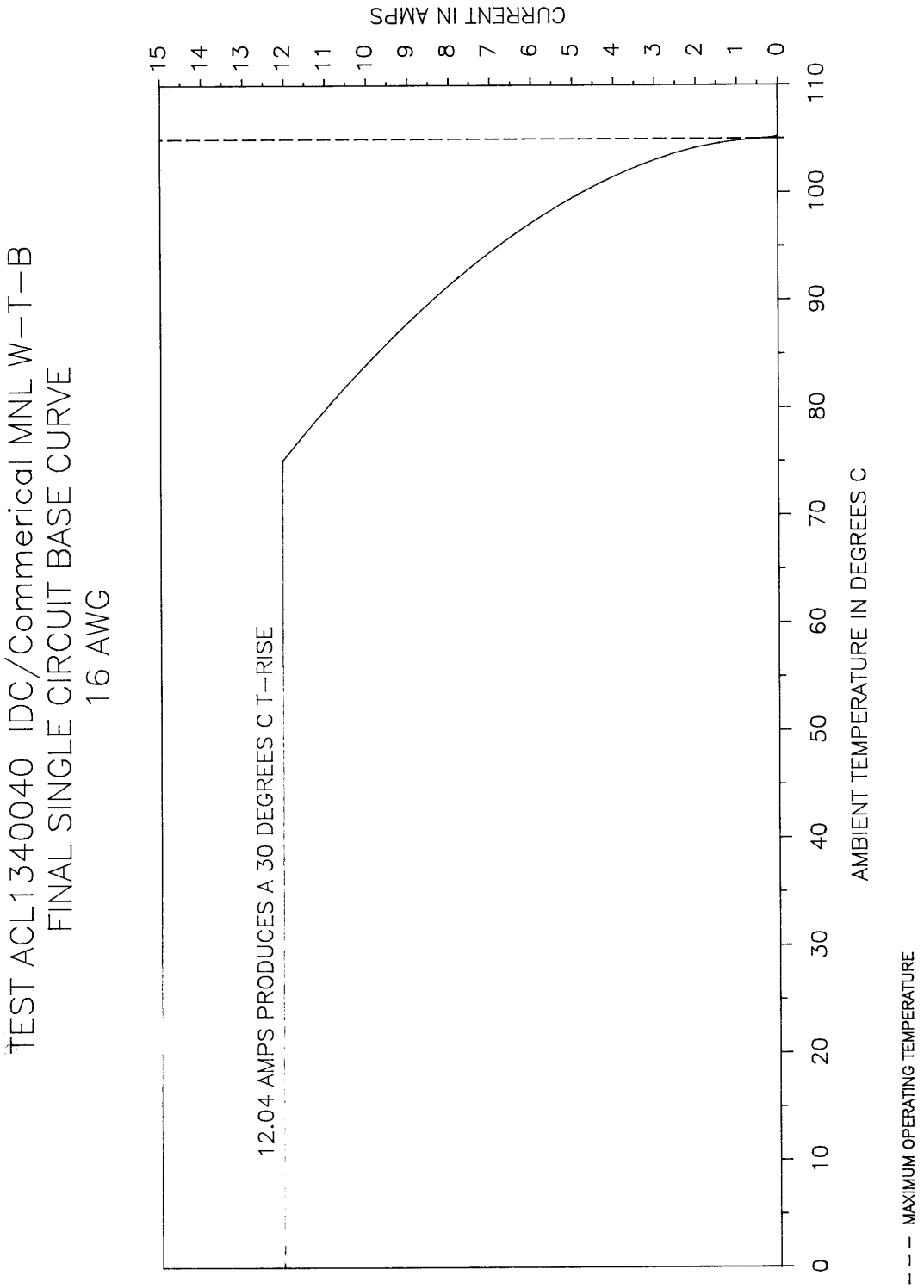


Figure 4A
Current Carrying Capability
Wire-To-Board Connector

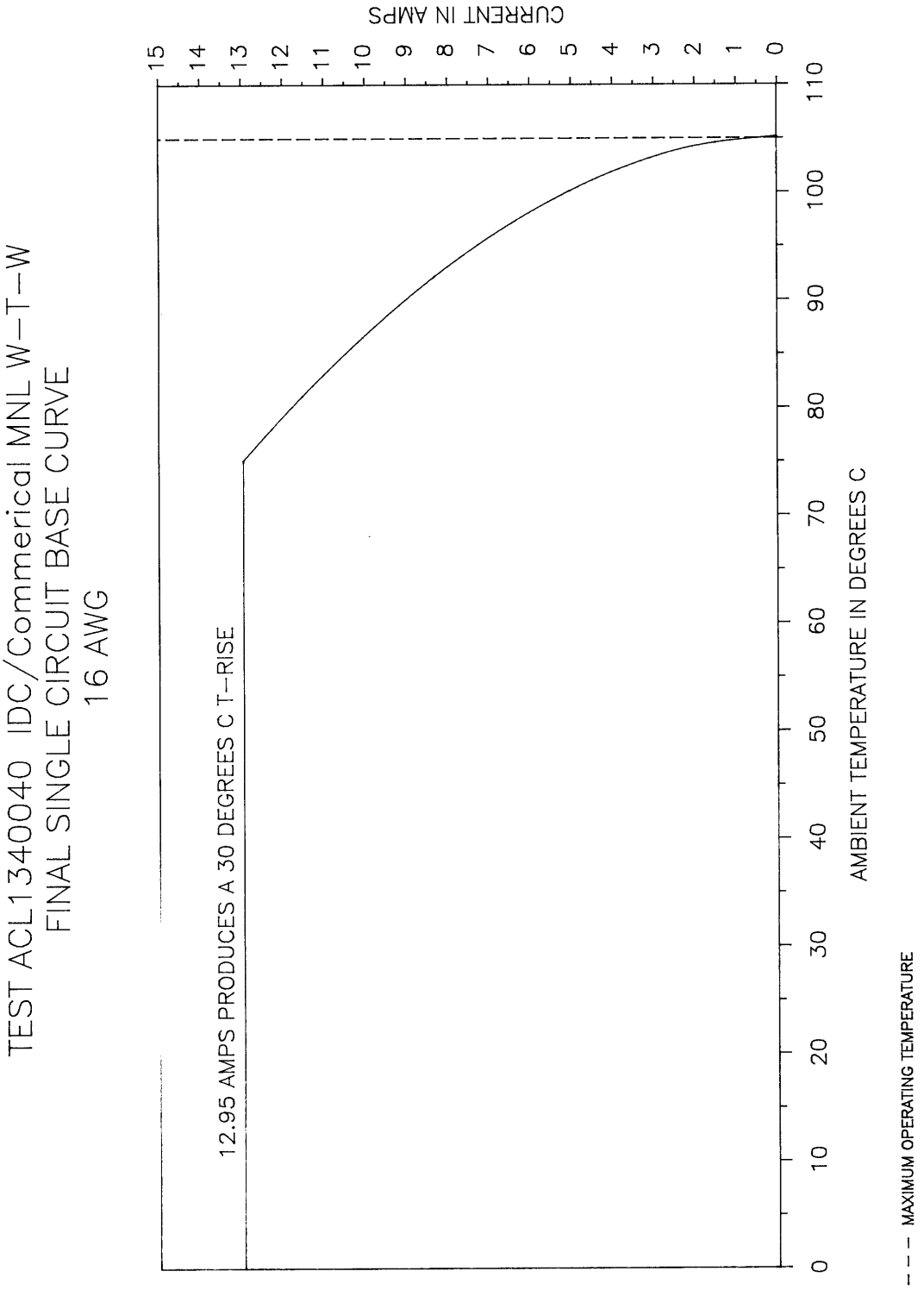


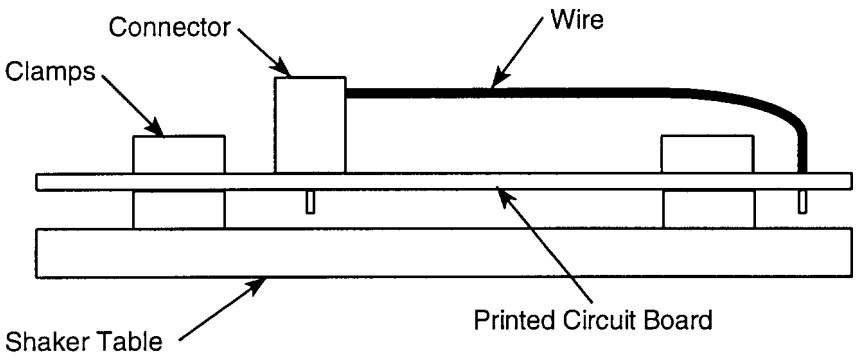
Figure 4B
Current Carrying Capability
Wire-To-Wire Connector

Percent Connector Loading	Wire Size AWG		
	22	18	16
Single Contact W-T-B	0.79146	0.91714	1.00000
50% W-T-B	0.77018	0.89247	0.97311
100% W-T-B	0.63418	0.73488	0.80128
Single Contact W-T-W	0.60666	0.83123	1.00000
50% W-T-W	0.58156	0.79684	0.95862
100% W-T-W	0.43033	0.58963	0.70934

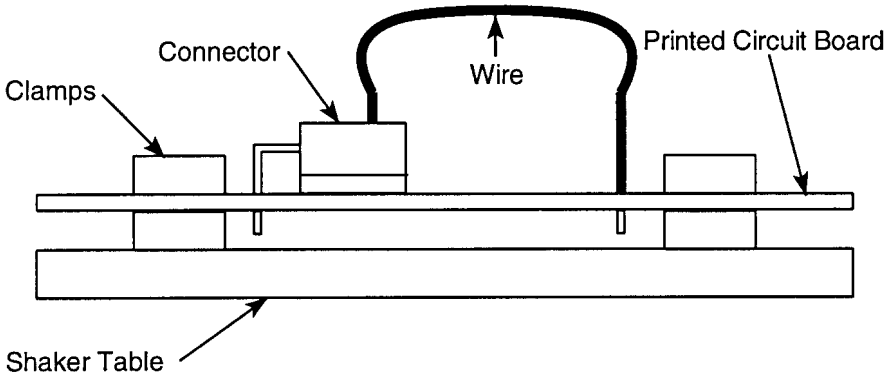
NOTE

To determine acceptable current carrying capacity for percentage connector loading and wire gage indicated, use the Multiplication Factor (F) from the above chart and multiply it times the Base Rated Current for a single circuit at the maximum ambient operating temperature shown in Figures 4A and 4B. The F-factor for the 50% loading condition is based on the temperature rise data from this test where the 2 end positions (#1 and #4) were energized. The F-factor will change if different positions are energized since the loading density calculation would be different.

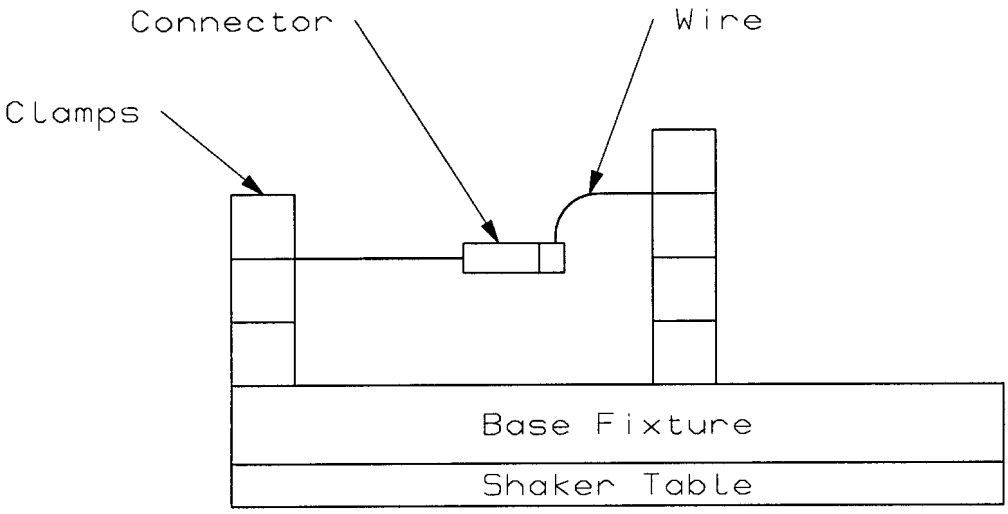
Figure 4C
Current Rating
Wire-To-Wire & Wire-To-Board Connectors



Vertical Mount, Wire-To-Board Connector



Right Angle Mount, Wire-To-Board Connector



Wire-To-Wire Connector

Figure 5
Vibration & Mechanical Shock Mounting Fixtures