PRODUCT SPECIFICATION

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality requirements for the AMPLIMITE* HD-20 cassette assembly connector system which consists of a cassette and holder assembly. Cassette assembly includes a 33 position right angle AMPLIMITE socket connector and the holder assembly includes a 33 position right angle AMPLIMITE pin holder.

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 Documents

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. 501-85 : Test Report
E. IS 6662: Instruction Sheet AMPLIMITE Connector Cassette and Holder Units

3. REQUIREMENTS

3.1. Design and Construction

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

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PAGE 1 OF 8

TITLE CONNECTOR SYSTEM AMPLIMITE CASSETTE HD-20

3.2. Material

A. Contacts:

(1) Socket, phosphor bronze
(2) Pin, Brass alloy

B. Housing: Thermoplastic

3.3. Ratings

A. Voltage: 250 vac

B. Temperature: -55° to 95°C

3.4. Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient temperature unless otherwise specified.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of Product	Meets requirements of product drawing.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination Resistance, Dry Circuit	35 milliohms maximum.	Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum, see Figure 4; AMP Spec 109-6-1.
Dielectric Withstanding Voltage	1 kvac dielectric withstanding voltage, one minute hold. One milliampere maximum leakage current.	Test between adjacent contacts of mated connector assemblies; AMP Spec 109-29-1
Insulation Resistance	5000 megohms minimum initial.	Test between adjacent contacts of mated connector assembly; AMP Spec 109-28-4.

Figure 1 (cont)

Test Description	Requirement	Procedure
	MECHANICAL	
Vibration, Sinusoidal High Frequency	No discontinuities greater 1 microsecond. See note (a)	Subject mated connectors to 20 G's, between 10-2000 Hz traversed in 20 minutes, 4 hours in each of 3 mutually perpendicular planes, see Fig 3; AMP Spec 109-21-4.
Physical Shock	No discontinuities greater 1 microsecond. See note (a)	Subject mated connectors to 50 G's half-sine shock pulses of 11 millisecond duration; 3 shocks in each direction applied along the 3 mutually perpendicular planes total 18 shocks, see Figure 3; AMP Spec 109-26-1.
Mating Force	16.5 pounds maximum initial.	Measure force necessary to mate connector assembly a distance of .175 from point of initial contact, incorporating free floating fixture at a rate of 1 inch/minute; AMP Spec 109-42, cond A.
Unmating Force	1.5 pounds minimum final.	Measure force necessary to unmate connector assembly at a rate of 1 inch/minute; AMP Spec 109-42, cond A.
Durability	Termination resistance, dry circuit.	Mate and unmate connector assemblies for 2000 cycles at a maximum rate of 200 cycles/hour; AMP Spec 109-27.
Solderability	Solderable area shall have a solder coverage of 95% minimum.	Subject contacts to solderability; AMP Spec 109-11-5.
	ENVIRONMENTAL	
Thermal Shock	Meet all subsequent tests.	Subject mated connectors to 5 cycles between -55° and 95°C; AMP Spec 109-22.

Figure 1 (cont)

Test Description	Requirement	Procedure
Humidity-Temperature Cycling	1000 megohms final insulation resistance; termination resistance, dry circuit.	Subject mated connectors to 10 humidity-temperature cycles between 25° and 65° C; AMP Spec 109-23, method III, cond B, with cold shock at -10°C, less step 7b.
Industrial Mixed Flowing Gas	Termination resistance, dry circuit.	Subject mated connectors to environmental class III for 20 days; AMP Spec 109-85-3.

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

Figure 1 (end)

3.6. Product Qualification, Requalification and Retention Tests

Test or Examination	Test Groups (a)(c)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Examination of Product	1,9	1,8	1,6	1,6	1,3	1,8	1,8
Termination Resistance, Dry Circuit	3,7		2,5	2,5			3,7
Dielectric Withstanding Voltage		3,7				3,7	
Insulation Resistance		2,6				2,6	
Vibration	5						
Physical Shock	6						
Mating Force	2						2
Unmating Force	8						6
Durability	4		3	3			4
Solderability					2		
Thermal Shock		4				4	
Humidity-Temperature Cycling		5	4			5	5
Industrial Mixed Flowing Gas				4			

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed
(c) Test groups 6 and 7 are for retention of qualification only.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1 Qualification Testing

A. Sample Selection

Connector housing and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test groups 1 thru 5 shall consist of 6 cassette connectors with their full compliment of contacts. All mating contact circuits in each cassette connector system shall be identified and used for all measurements unless otherwise specified. Connectors shall be mounted on printed circuit boards. A minimum of 1 contact per row of each header shall be identified and used for inspection purposes for group 5 only.

B. Test Sequence

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

4.2. Retention of Qualification

If, in a three-year period, no changes to the product or process occur, the product shall be subjected to the two groups of the testing described in the test sequence, see Figure 2. Test groups 6 and 7 shall consist of 2 cassettes with their full compliment of contacts. Justification for exceeding this time limit must be documented and approved by the division manager.

4.3. Requalification Testing

If changes significantly affecting form, fit, or function are made to the product or to the 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.

4.4. 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 AMP 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.

4.5. Reliability Estimates

A. Estimated reliability is provided relative to acceptance criteria for specific failure mechanisms using environmental test conditions (Heat Age and Industrial Mixed Flowing Gas) with known acceleration factors. Heat Age testing and IMFG testing have acceleration factors that are generally accepted by industry. Corresponding failure mechanisms are stress relaxation and corrosion. "Estimated reliability" refers to the estimated proportion of product whose values of the performance parameter (e.g., change in interface resistance) will be on the acceptable side of the acceptance criterion. See Para 4.6.

B. Humidity/temperature testing is performed and estimated reliability relative to the test is provided, but there are no accepted acceleration factors for relating humidity/temperature testing conditions and duration to operating conditions and life. Therefore these estimates of reliability refer only to the specified test conditions, not to the operating conditions, and are for information or comparative purposes only.

C. Product reliability relative to a specified acceptance criterion for a particular performance parameter is estimated from environmental test data using one-sided tolerance limit factors (k-factors) for the normal distribution.

Greatly simplified, the procedure is as follows: Samples of the product are subjected to environmental stress testing, and measurements are taken of some performance parameter such as change in interface resistance for pressure connections, or resistance across a solder joint for surface-mounted devices, etc. The data are tested for goodness of fit to a normal distribution. If the data provide a satisfactory fit to a normal distribution, then the "k-factor" is computed from $k = (UL-X)/S$, where

UL denotes the specified allowable upper limit, or acceptance criterion, for the performance parameter (measurements greater than UL indicate product failure),

X denotes the average of the sample measurements, and

S denotes the standard deviation of the sample measurements (calculated using a denominator of n-1, where n denotes the sample size)

The calculated value of k is then compared with a table of factors for one-sided tolerance limits for a normal distribution to determine the product reliability and associated "confidence" that may be claimed, based on the test data.

D. The acceptance criterion used is the maximum change in contact resistance permitted in the dry circuit resistance test as determined from contact physics (constriction resistance and super-temperature for high current contacts at rated current). Variables data of change in termination resistance are considered acceptable for making estimates of product reliability if a normal probability plot and appropriate statistical analysis indicate agreement of the data with a normal distribution.

4.6. Reliability Tests

The following tests shall be performed to determine estimates of reliability:

A. Industrial Mixed Flowing Gas

Fifty contacts shall be tested according to class III of Test Specification 109-85-3. Separable connections shall be mated and unmated for 10 cycles before submission to the Industrial Mixed Flowing Gas test.

B. Humidity/Temperature

Fifty contacts shall be tested at 25-65°C and 95% humidity in a Humidity/Temperature chamber according to the requirements of Test Specification 109-23, method III, cond B.

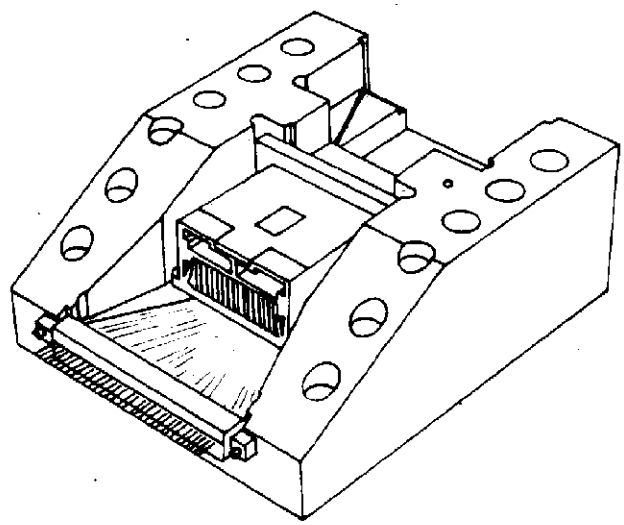

Figure 3
Mounting and Clamping Locations for
Vibration and Physical Shock

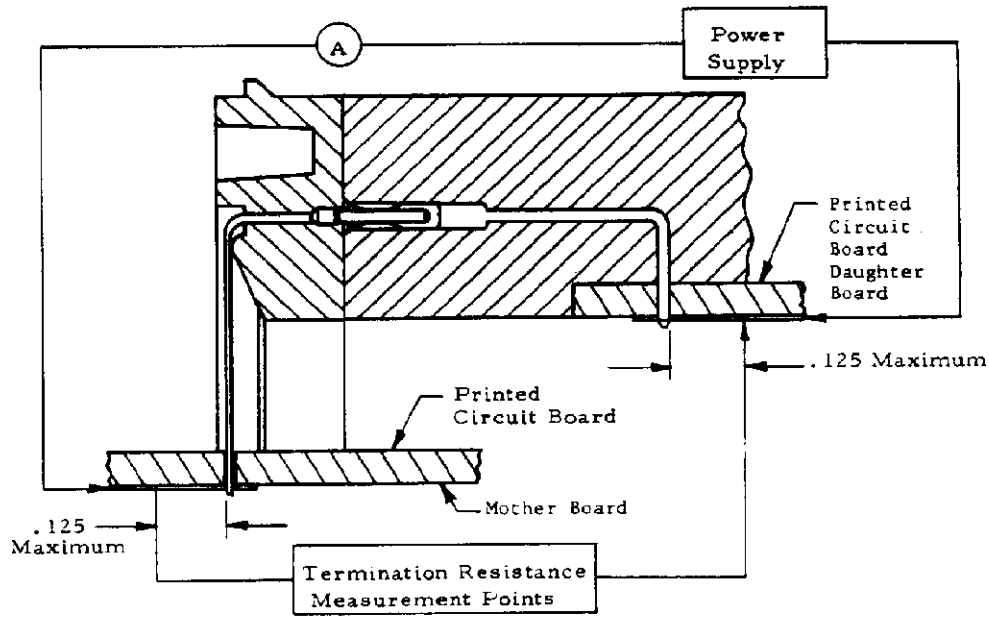

Figure 4
Resistance and Temperature Measurement Points