Sealed Circular Plastic Connector With Removable Crimp Contacts

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for TE Connectivity (TE) sealed circular plastic connectors with removable crimp contacts. These connectors are designed for use in electronic, electric power and control units where environmental protection is needed.

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 16Jun97. The Qualification Test Report number for this testing is 501-517. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following TE 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.

- 109-1: Test Specification (General Requirements for Test Specifications)
- 109-197: Test Specification (AMP Test Specifications vs EIA and IEC Test Methods)
- 109 Series: Test Specifications as indicated in Figure 1
- 114-10038: Application Specification (Circular Plastic Connectors (CPC))
- 501-517: Qualification Test Report (Sealed Circular Plastic Connector With Removable Crimp Contacts)

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

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Voltage: 250 volts AC
- Current: See Figure 5 for applicable current carrying capability
- Temperature: -55 to 105℃

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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 114-10038.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance.	See Figure 3.	TE Spec 109-6-6. Subject mated contacts assembled in housing to 20 millivolts maximum open circuit at 100 milliamperes maximum. See Figure 4.
Insulation resistance.	5000 megohms minimum.	TE Spec 109-28-4. 500 volts DC, 2 minute hold. Test between adjacent contacts of mated specimens.
Dielectric withstanding voltage.	One minute hold with no breakdown or flashover.	TE Spec 109-29-1. 1500 volts AC at sea level. Test between adjacent contacts of mated specimens.
Temperature rise vs current.	30°C maximum temperature rise at specified current.	TE Spec 109-45-1. Measure temperature rise vs current. See Figure 5.
MECHANICAL		
Vibration, sinusoidal.	No discontinuities of 1 microsecond or longer duration. See Note.	TE Spec 109-21-3. Subject mated specimens to 10-2000-10 Hz traversed in 20 minutes. Four hours in each of 3 mutually perpendicular planes. See Figure 6.
Physical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	TE Spec 109-26-1. Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 6.
Durability.	See Note.	TE Spec 109-27. Mate and unmate specimens for 500 cycles at a maximum rate of 600 cycles per hour.

Figure 1 (continued)

Test Description	Requirement	Procedure
Contact retention.	Contact Size / Axial Load (Lbs Min) 16 — 10 8 (Powerband) — 25	TE Spec 109-30-2. Apply axial load to crimped contacts at the engaging end at a rate of 0.5 inch per minute.
Coupling torque.	1 inch-pound minimum, 15 inch-pounds maximum with size 17 shell.	TE Spec 109-42, Condition B. Measure force necessary to couple specimens at a maximum rate of 45 degrees rotation per second.
Uncoupling torque.	1 inch-pound minimum, 15 inch-pounds maximum with size 17 shell.	TE Spec 109-42, Condition B. Measure force necessary to uncouple specimens at a maximum rate of 45 degrees rotation per second.
Dust powder.	See Note.	TE Spec 109-190-2.
Water jet splashing.	See Note.	TE Spec 109-191-3.
Impact.	See Note.	Specimens, wired as intended for normal service, shall be securely fastened to the test fixture such that the specimen can hang freely and rest against the vertical face of a 1½ to 2 inch thick block of steel that is sufficiently high and wide to ensure that the specimen will not strike near one of the edges of the block. The specimen shall be extended its full length from the test fixture to a horizontal position and allowed to fall freely by pendulum action to strike the block. The distance from the fixture to the mating end of the specimen shall be a minimum of 32 inches. There shall be 8 drops with the radial orientation for each drop dictated by using a different index position of the test fixture.
ENVIRONMENTAL		
Thermal shock.	See Note.	TE Spec 109-22. Subject mated specimens to 5 cycles between -55 and 125℃.
Humidity/temperature cycling.	See Note.	TE Spec 109-23-3, Condition B. Subject mated specimens to 10 cycles between 25 and 65℃ at 95% RH.

Figure 1 (continued)

Test Description	Requirement	Procedure
Temperature life.	See Note.	TE Spec 109-43. Subject mated specimens to temperature life at 125℃ for 1000 hours.
Mixed flowing gas.	See Note.	TE Spec 109-85-3. Subject mated specimens to environmental Class III for 20 days.

NOTE *Shall meet visual requirements, show no physical damage detrimental to the performance of the product 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	4
	Test Sequence (b)			
Examination of product	1,9	1,9	1,9	1,7
Termination resistance	3,7	2,7		2,6
Insulation resistance			2,6	
Dielectric withstanding voltage			3,7	
Temperature rise vs current		3,8		
Vibration	5	6(c)		
Physical shock	6			
Durability	4			
Contact retention			8	
Coupling torque	2			
Uncoupling torque	8			
Dust powder				4
Water jet splashing				5
Impact				3
Thermal shock			4	
Humidity/temperature cycling			5	
Temperature life		5		
Mixed flowing gas		4(d)		

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℃ level for 100% loadings per Test Specification 109-151.
(d) Precondition specimens with 10 cycles durability.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall consist of a minimum of 5 specimens.

B. Test Sequence

Qualification inspection shall be verified by testing specimens 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 specimens 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.

Contact Size	Wire Size	Termination Resistance (Milliohms Maximum)
8	8	.8
	10	.95
	12	1.25
	14	1.5
16	16	6.5
	18	7.5
	20	9
	22	9.5
	24	14.5
	26	19

Figure 3
Termination Resistance Requirements

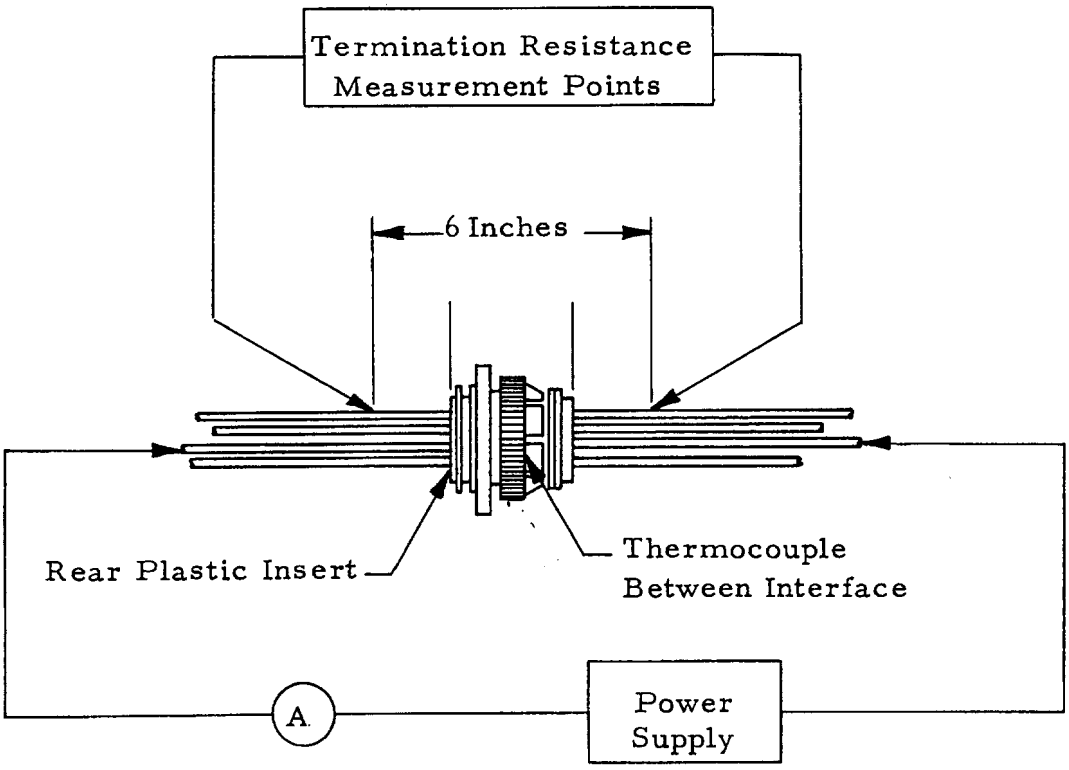


Figure 4
Termination Resistance Measurement Points

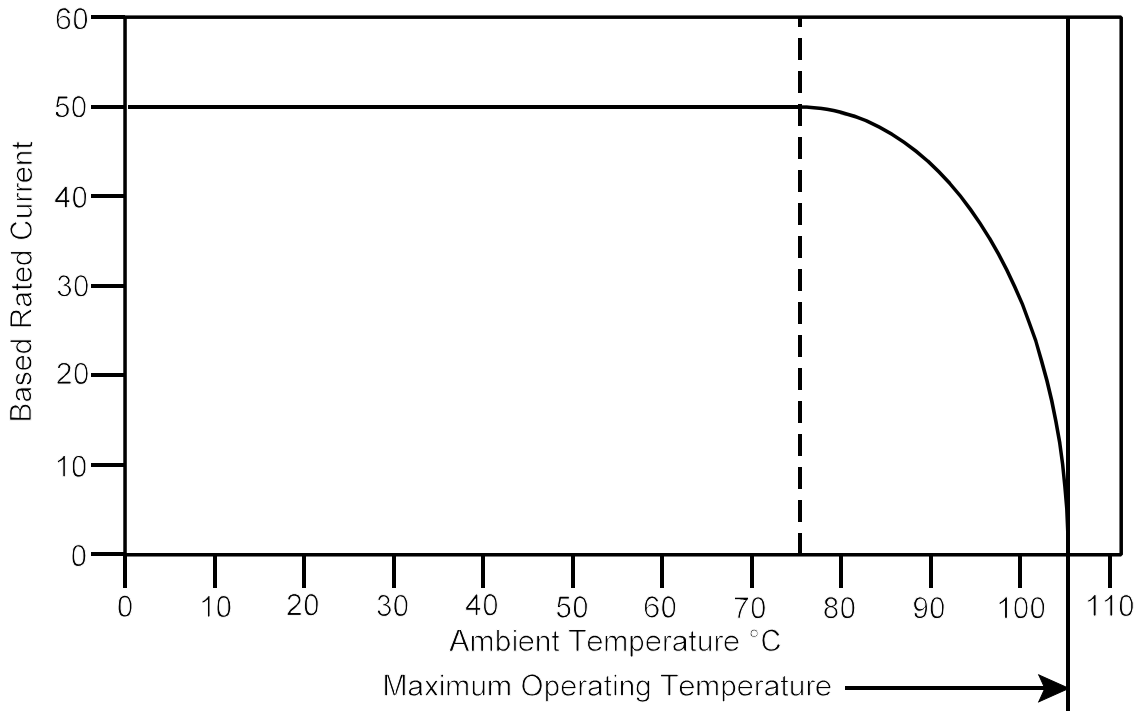


Figure 5A
Current Carrying Capability

Percent Connector Loading	Wire Size AWG			
	14	12	10	8
Single Contact	0.47	0.58	0.74	1.00
67	0.44	0.54	0.69	0.93
100	0.37	0.46	0.58	0.78

Figure 5B
Current Rating

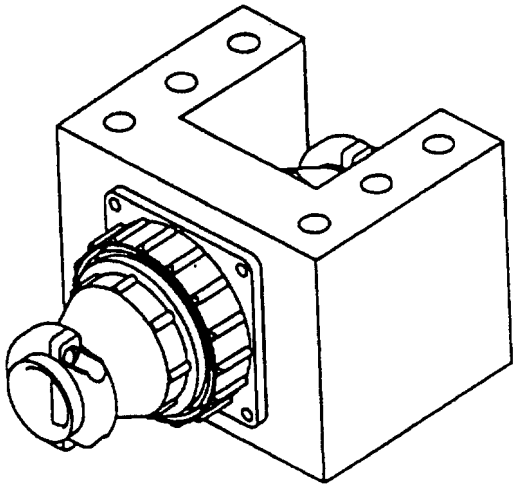


Figure 6
Vibration & Physical Shock Mounting Fixture