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**Metal Shell Micro Circular Connector System**

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**1. SCOPE****1.1. Content**

This specification covers performance, tests and quality requirements for the Tyco Electronics Metal Shell Micro Circular Connector System (threaded version). This system is used primarily in industrial, commercial and military applications where durability and reliability are of primary concern. Two shell sizes provide up to 19 contact positions. Shell size M11 accommodates 7 contacts while shell size M14 accommodates 19 contacts. The system is sealed to level IP67 and is available in wire-to-wire, wire-to-panel, and wire-to-board configurations. Plugs and receptacles incorporate solder cup terminals which will accommodate 24 to 30 AWG solid and stranded conductors (24 AWG is limited to 7 strands).

**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 20Sep07. The Qualification Test Report number for this testing is 501-664. This documentation is on file at and available from Engineering Practices and Standards (EPS).

**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. Tyco Electronics Documents**

- 109-197: Test Specification (AMP Test Specifications vs EIA and IEC Test Methods)
- 114-13201: Application Specification (Metal-Shell Micro Circular Connectors with Spring-Loaded Contacts)
- 501-664: Qualification Test Report (Metal Shell Micro Circular Connector System)

**2.2. Industry Standards**

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC-60529: Degrees of Protection Provided by Enclosures (IP Code)

**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: 200 volts AC
- Current: 2 amperes maximum
- Temperature: -55 to 150°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.

### 3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
<b>ELECTRICAL</b>		
Low Level Contact Resistance (LLCR).	30 milliohms maximum.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance.	5000 megohms minimum initial. 1000 megohms minimum final.	EIA-364-21. Test between adjacent contacts.
Withstanding voltage.	1 minute hold with no breakdown or flashover.	EIA-364-20, Condition I. 450 volts AC at sea level. Test between adjacent contacts.
Shielding effectiveness.	50 dB minimum, Common Mode.	EIA-364-66. Measure shielding effectiveness between 200 MHz and 1 GHz.
Shell-to-shell conductivity (nickel plated specimens only).	20 millivolts maximum voltage drop.	EIA-364-83.
<b>MECHANICAL</b>		
Solderability, dip test.	Solderable area shall have a minimum of 95% solder coverage.	EIA-364-52, Category 3, Class 1. Subject contacts to solderability.

Figure 1 (continued)

Test Description	Requirement	Procedure
Sinusoidal vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition I. Subject mated specimens to 10-55-10 Hz traversed in 1 minute with 0.06 inch maximum total excursion. Two hours in each of 3 mutually perpendicular planes. See Figure 3.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Method A. 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 4.
Durability.	See Note.	EIA-364-9. Mate and unmate specimens for 2500 cycles for compression seal and spring probe product, and 500 cycles for shear seal products at a maximum rate of 500 cycles per hour.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32. Subject specimens to 5 cycles between -55 and 150°C.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III. Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 10, Test Time Condition C. Subject mated specimens to 150°C for 500 hours.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA (4 gas). Subject mated specimens to environmental Class IIA for 20 days.
Temporary immersion.	No water leakage. See Note.	IEC 60529, Second Characteristic Numeral 7, Section 14.2.7. Immerse mated specimens in water to a depth of 1 meter from the top surface of the specimen to the surface of the water for 30 minutes.
Salt spray (nickel plated specimens only).	No corrosion sites. See Note.	EIA-364-26, Test Condition B. Subject mated specimens to 5% salt concentration for 48 hours.

**NOTE**

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1 (end)

## 3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Initial examination of product	1	1	1	1	1	1	1
LLCR	2,8	2,4	2,4				
Insulation resistance				2,6			
Withstanding voltage				3,7			
Shielding effectiveness (c)						2	
Shell-to-shell conductivity (d)	3,9						
Solderability, dip test					2		
Sinusoidal vibration	5						
Mechanical shock	6						
Durability	4						3
Thermal shock				4			
Humidity/temperature cycling				5			
Temperature life		3(e)					
Mixed flowing gas			3(e)				
Temporary immersion (f)							2,4
Salt spray (d)	7						
Final examination of product	10	5	5	8	3	3	5

**NOTE**

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Adapters only.
- (d) Nickel plated specimens only.
- (e) Precondition specimens with 10 durability cycles.
- (f) Specimens shall consist of mated plug and receptacle, mated receptacle to panel with "o" ring and mated dust cap to receptacle.

Figure 2

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#### 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. Each test group 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. If 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 shall 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.



Figure 3  
Vibration Mounting Fixture

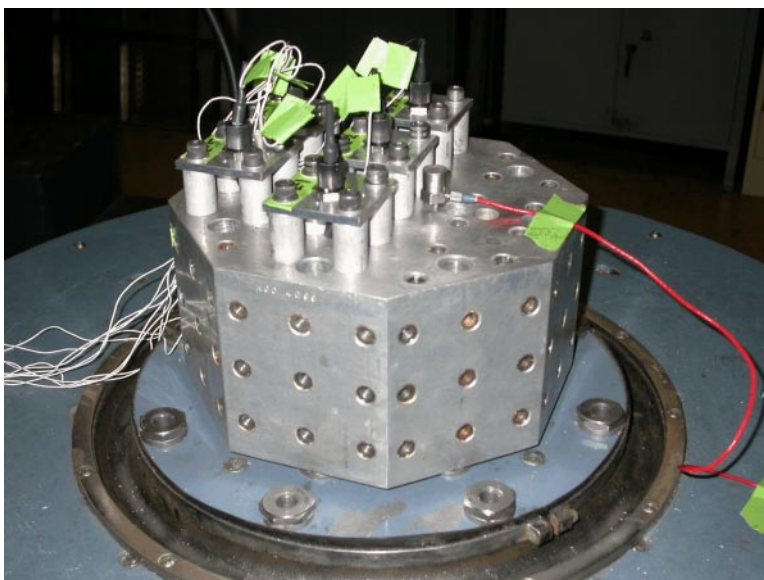


Figure 4  
Mechanical Shock Mounting Fixture