



EP 2.5 new Connector System

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Economy Power (EP) 2.5 Connector System. The EP 2.5 product is a wire-to-board and wire-to-wire connection consisting of crimp-snap contacts seated in a housing that mates to 0.6 mm diameter post headers or receptacle housing on 2.5 mm centerline and is designed to be terminated to 20 to 26 AWG wire. A complete connector consists of an assembled header or receptacle housing, plug housing, housing, receptacle contact and an optional TPA device.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Table 1 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. 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 Documents

- A. [102-950](#): Quality Specification (Qualification of Separable Interface Connectors)
- B. 109 Series: Test Specifications as indicated in Table 1
- C. [114-13315](#): Application Specification (Economy Power 2.5 Contacts and Connectors)
- D. [501-134011](#): Qualification Test Report (EP 2.5 Connector System)

2.2. Industry Document

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

2.3. Reference Document

[109-197](#): Test Specification (Tyco Electronics Test Specifications vs. EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

- A. Voltage: 250 volts AC
- B. Current: See Figure 2 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 the housings (30°C). Variables to be considered for each application are: wire size, connector size, contact material, ambient temperature, and printed circuit board design.
- C. Temperature: -55 to 105°C

3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirements	Procedures
Initial examination of product.	Meets requirements of product drawing and Application Specification 114-13315.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual examination.
ELECTRICAL		
Low Level Contact Resistance (LLCR).	10 milliohms maximum initial. 20 milliohms maximum final.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. See Figure 3.
Insulation resistance.	1000 megohms minimum initial. 500 megohms minimum final.	EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts.
Withstanding voltage.	One minute hold with no breakdown or flashover. 1.3 milliamperes maximum leakage current.	EIA-364-20, Condition I. 1000 volts AC at sea level. Test between adjacent contacts.
Temperature rise vs. current.	30°C maximum temperature rise.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C. See Figure 4.
MECHANICAL		
Sinusoidal vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition I. Subject mated specimens to 10 to 55 to 10Hz traversed in 1 minute with 1.5 mm maximum total excursion. Two hours in each of 3 mutually perpendicular planes.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Method H. Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
Durability.	See Note.	EIA-364-9. Mate and unmate specimens for 15 cycles at a maximum rate of 500 cycles per hour.

Figure 1 cont

Test Description	Requirements	Procedures
Mating force.	8.9N maximum per contact for standard contact (PN: 2110989-1, 1744423-1) 3.5N maximum per contact for LIF contact (PN: 2232905-1, 2232983-1)	EIA-364-13. Measure force necessary to mate specimens with companion headers a distance of 5.08 mm from point of initial contact at a maximum rate of 12.7 mm per minute.
Unmating force.	0.9 N minimum per contact.	EIA-364-13, Method A. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm per minute with latch disengaged.
Crimp tensile.	20 AWG 73.7N min 26 AWG 24.1N min	EIA-364-8. Determine crimp tensile at a rate of 25.4 mm per minute.
Contact retention.	20N minimum	EIA-364-29, Method C. Apply axial load at a rate of 12.2 mm/min.
Resistance to soldering heat.	See Note.	TE Spec. 109-202 Condition C Solder Temperature: 260 +0/-5°C Immersion Duration: 5 +2/-0 Sec
Connector locking strength.	40N minimum for dual row 25.8N minimum for single row	EIA-364-98. Measure connector locking strength at a maximum rate of 100 mm [3.9 in] per minute.
Post retention.	20N minimum	EIA-364-29. Measure post retention at a maximum rate of 100 mm [3.9 in] per minute.
Contact insertion force.	6.9 N maximum per contact.	EIA-364-5. Measure force necessary to insert a contact into the housing.

ENVIRONMENTAL

Thermal shock.	See Note.	EIA-364-32, Test Condition VII. Subject mated specimens to 10 cycles between -55 and 105°C with 30-minute dwells at temperature extremes and 1 minute transition between temperatures.
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 4, Test Time Condition C. Subject mated specimens to 105°C for 500 hours.
Salt spray.	See Note.	EIA-364-26. Subject mated specimens to 5% salt concentration for 48 hours.

Figure 2 cont

Hydrogen sulfide.	See Note.	Subject mated specimens to 3 ± 1 ppm H_2S gas concentration maintained at $40 \pm 2^\circ C$ for 96 hours.
Ammonia.	See Note.	Subject mated specimens in 10 liter desiccator with 500ml of 3% ammonia solution for 7 hours.

Figure 3 end



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 4.

3.4. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (b)										
Initial examination of product	1	1	1	1	1	1	1	1	1	1	1
LLCR	3,7	2,7							2,4	2,4	2,4
Withstanding voltage			2,4								
Temperature rise vs. current		3,8									
Sinusoidal vibration	5	6(c)									
Mechanical shock	6										
Durability	4										
Mating force	2										
Unmating force	8										
Crimp tensile				2							
Contact retention			6								
Resistance to soldering heat					2						
Connector locking strength						2					
Post retention							2				
Contact insertion force								2			
Thermal shock			3								
Humidity/temperature cycling		4(d)									
Temperature life		5									
Salt spray									3		
Hydrogen sulfide										3	
Ammonia											3
Final examination of product	9	9	5	3	3	3	3	3	5	5	5

Figure 4



NOTE

- Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. Test groups 1, 2, 3 and 5 shall each consist of a minimum of 5 specimens with a minimum of thirty (30) data points. Test group 4 shall consist of a minimum of 5 specimens with a minimum of thirty (30) header posts. Test groups 6, 7, 8, 9, 10, and 11 shall each consist of a minimum of five (5) specimens.
- Numbers indicate sequence in which the tests shall be performed.
- Discontinuities shall not be measured. Energize at $18^\circ C$ level for 100% loadings per Quality Specification 102-950.
- Precondition specimens with ten (10) durability cycles.

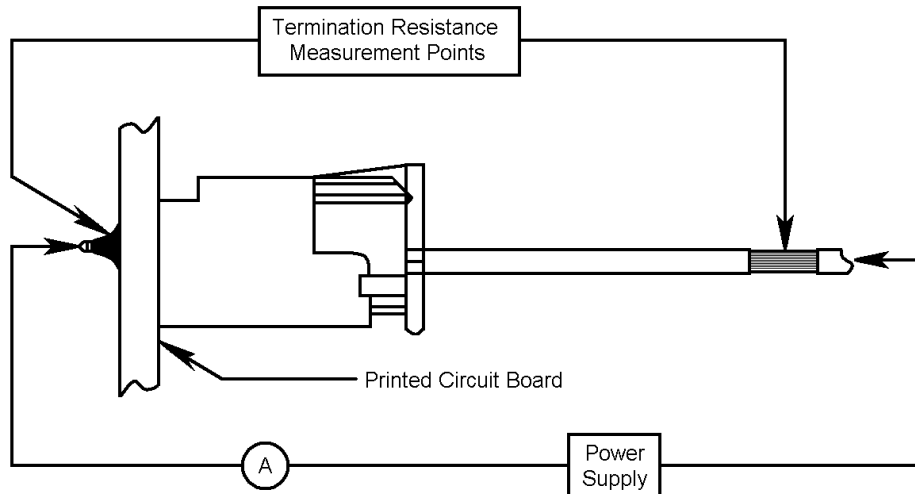


Figure 3
LLCR Measurement Points (Subtract Wire Bulk)

Table 3 – Current Rating Factors (F)

Percent Connector Loading	Wire Size AWG		
	26	24	22
Single Contact	0.797	0.889	1
50	0.639	0.712	0.801
100	0.519	0.578	0.650

F-Factor Table

To determine acceptable current rating 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 desired ambient operating temperature shown in Figure 4.

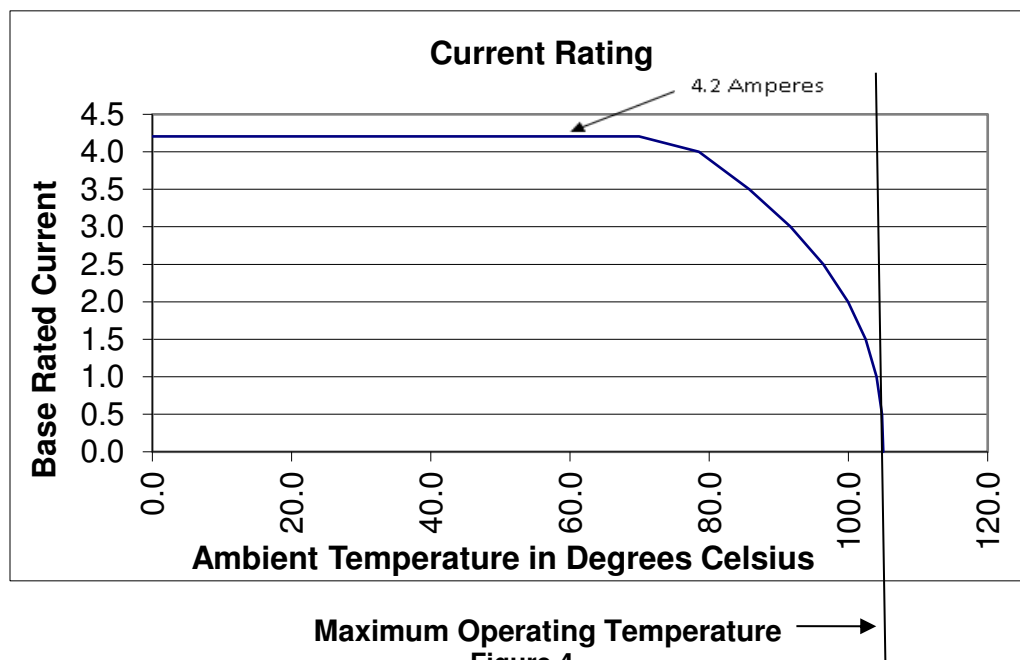


Figure 4
Current Carrying Curve

4. QUALITY ASSURANCE PROVISIONS

4.1. Test Conditions

Unless otherwise specified, all the tests shall be performed in any combination of the following test conditions shown in Figure 5.

Temperature	15°C – 35°C
Relative Humidity	45% – 75%
Atmospheric Pressure	86.6 – 106.6 kPa

Figure 5

4.2. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 4.

4.3. 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.

4.4. Acceptance

Acceptance is based on verification that the product meets the requirements in 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.

4.5. 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.