

Stamped and Formed Contacts

1. SCOPE

1.1. Content

This specification covers the performance, tests and quality standards for TE connectivity stamped and formed contacts. These contacts are used in solar connector and other electronic components and are primarily intended for use where coupling means is provided separately from individual contact

1.2. Qualification

When tests are performed on the subject product line, the following specified specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification to the extent specified herein. In the case of a conflict between the requirements of this specification and the product drawing or of conflicts between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity Documents

- A. 109-1: Test Specification (General Requirements for Test Specifications)
- B. 109-25: Test Specification (Termination Resistance, Specified Current)
- C. 109-27: Test Specification (Durability For Electrical Connectors)
- D. 109-35: Test Specification (Contact Engaging and Separating Force)
- E. 109-51: Test Specification (Current Cycling)
- F. EN 50521: Connectors for photovoltaic systems - Safety requirements and tests
- G. UL1703: Flat-Plate Photovoltaic Modules and Panels

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

- Current/Voltage: The continuous current rating for individual contacts cannot be applied

directly to the number of contacts as they are dependent on the thermal and physical properties of the material. System design shall assure that continuous current rating does not create internal hot spots that exceed the temperature designated by the connector specification, during steady state or transient conditions:

- Ambient temperature :-40°C ~+90°C for Tin plated contacts

3.4. Performance and Test Description

Contact shall be 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	Requirements			Procedure
Examination of product	Meet requirements of product drawing			Visual, Dimensional and functional per applicable inspection plane.
ELECTRICAL				
Termination resistance, specified current	Wire size	Test current	Resistance	Measure potential drop of mated contacts after stabilizing. Calculate resistance Engagement depth:10mm±0.5mm See Figure 3 Per TEC 109-25
	4.0mm ² /12AWG	35A	5.0 mΩ Max.	
	6.0mm ² /12AWG	40A	5.0 mΩ Max.	
Contact resistance, specified current	The Max. values shall be 0.5mΩ			Measure potential drop of mated contacts after stabilizing. Calculate resistance Test current:1A Engagement depth:10mm±0.5mm See Figure 3 Per TEC 109-25
Current Cycling	Termination resistance, specified current			Subject mated contacts to 500 cycles at 125% of specified current for 30 minutes ON and 15 minutes OFF Per TEC Spec 109-51, condition B, Test Method 3
MECHANICAL				
Contact engaging force	See Figure 4 for maximum force per contact			Measure force to engage using gage 1 as indicated in Figure 5 at the rate of 25mm/min. Per TEC 109-35
Contact Separating force	See Figure 4 for minimum force per contact			Insert gage 2 as indicated in Figure 5 and Measure force to separate at the rate of 25mm/min. Per TEC 109-35

Durability	Show no evidence of damage (including Dovetail groove feature can not open); Meet contact engaging and separating force	Contact shall be installed in a suitable fixture and subjected to 100cycles at a rate of 300 Max. cycle per hour. The applicable counterpart connector inserts may be used for the fixture Per TEC 109-27
Crimping tensile strength	The Min. values of the pull out force shall be 310N for 4mm ² and 360N for 6mm ² See Table 1 of EN60352-2	Pull out force test of crimped connections at a rate of 25mm/min Per 5.5 of EN 50521
ENVIRONMENTAL		
Temperature Cycle Test (Thermal Cycle)	Shall show no evidence of damage; Meeting termination resistance and contact resistance; contact engaging and separating force	Subject mated contacts to -40±2°C to +90±2°C, Dwell time: 0.5 ~ 1.75h each extreme, Cycle time: 6h Max. Rate of change: 120°C/h Max. 200 cycles with current rating, see Figure 35.1 Per 35 of UL1703
Damp Heat	Shall show no evidence of damage; Meeting termination resistance and contact resistance; contact engaging and separating force	Subject mated contacts to 1000h at +85°C±2°C and 85%±5%RH, 10.13 of IEC 61215 Per 6.3.12 of EN 50521
Humidity Freezing Test	Shall show no evidence of damage; Meeting termination resistance and contact resistance; contact engaging and separating force	Subject mated contacts to 10 cycles from +85°C±2°C, 85%RH±2.5% to -40°C±2°C, see Figure 36.1 Per 36 of UL1703

Figure 1

3.6. Test Sequences

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequences (b)		
Examination of product	1,10	1,6	1,9
Termination resistance, specified current		2,4	
Contact resistance, specified Current	2,7		2,6
Current Cycling		3	
Contact engaging force	8		3,7
Contact Separating force	9		4,8
Durability	3		5
Crimping tensile strength		5	
Temperature Cycle Test (Thermal Cycle)	4		

Damp Heat	5		
Humidity Freezing Test	6		

(a) see paragraph 4.1A

(b) Number indicate sequence in which tests are performed

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. All test group shall consist of 10 samples of each part number (pin and socket). One half of the samples shall be crimped to maximum gauge wire and the other half crimped to minimum. All wire lengths shall be a minimum of 500mm

B. Test Sequence

The samples shall be prepared in accordance with product drawings. They shall be selected at random from current production.

4.2. Requalification Testing

If changes significantly affecting form, fit or functions 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 paragraph 3.5. 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 re-submittal.

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. Bulk wire resistance shall be subtracted from resistance readings.

Annex

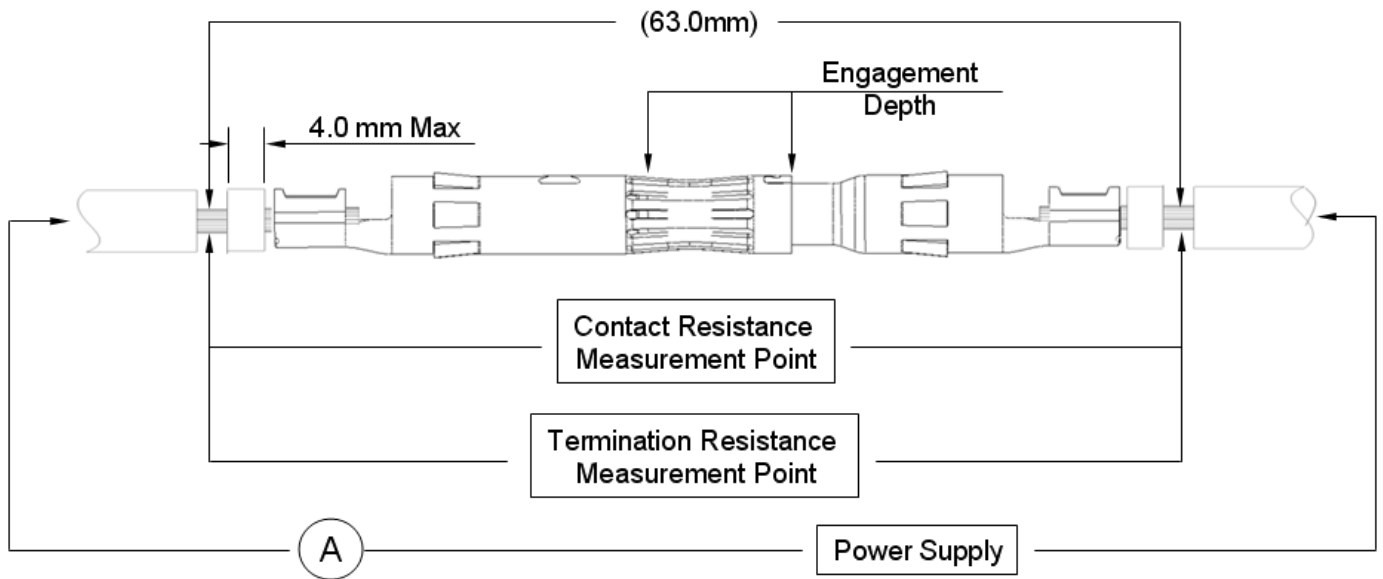


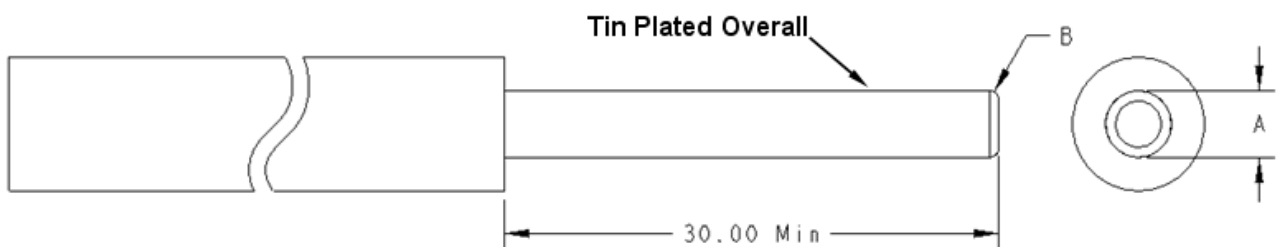
Figure 3

Termination and Contact Resistance Measurement Test Circuit

Engagement Depth (mm)	Pin Diameter (mm)	Minimum Separation Force (N)	Maximum Engagement Force (N)	Phase
10.0±0.5	3.96±0.03	10	30	Un-plated (in stamping)
10.0±0.5	3.96±0.03	15	40	Plated

Figure 4

Contact Engagement and Separation Force



Gage Number	Dim A	Dim B
1	3.990+0.005/-0	R 0.8±0.2
2	3.930+0/-0.005	R 0.8±0.2

Figure 5

Engaging and Separating Gages

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